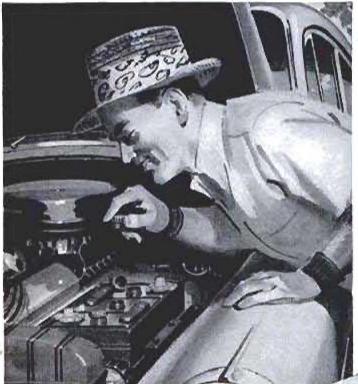




JONNSON SEA-HORSES FOR DEPENDABILITY

^{*}Electric Starting . . . Prices f. o. b. factory, subject to change . . . All models except the "3" have separate Mile-Master Fuel System . . . All ratings are OBC certified brake horsepower at 4000 rpm (30's at 4500).

Texaco Tips On Car Care

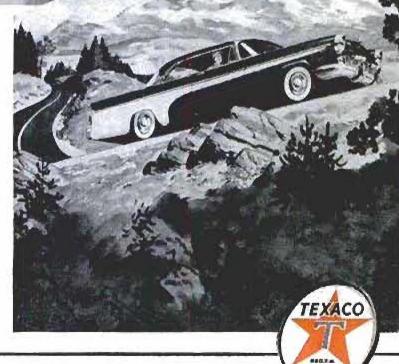


Check battery water level

Now, during the hot summer months, it's wise to check your battery water level more frequently than usual. Water evaporates quickly under high temperature, in just a few days can drop below top of plates, drying them out, reducing power and permanently damaging the battery. Maintain water level approximately %" above plates. And to protect battery terminals from corrosion, scrape or wire brush both clamps and terminal posts until clean and then apply a coating of light grease.

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BOUNCE FLASH

Can be tripped with the thumb or forefinger of the left hand which normally holds the camera. This, of course, leaves the right hand free to aim an electronic flash or conventional flash such as the Graffite Jr. Previously only the regular Graffite offered such convenience.

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Electrified Pacemaker Graphics are available in two models equipped with f/4.7 Optar lens in fully synchronized shutter and built-in Graphic Rangefinder: CFE-93 Crown Graphic . . . \$325.50; SFE-93 Speed Graphic . . . \$381.50. Pay as little as \$17.58 a month. See your Graflex dealer listed in the "Yellow Pages" of your telephone book or write Graflex, Inc., Department PM-76, Rochester 8, N. Y.

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Robot Conductor For Railroads

Displayed at the 34th Annual Trade Fair at Milan, Italy, a mechanical train conductor gives information to passengers in two languages. The device tells the passengers where and when the train stops, what points of interest are being passed, and supplies other information normally supplied by railway employees. The information is read from a paper roll in a viewing box. The roll is prepared to cover six days of the train's operation and moves in ratio to the train's speed. The device will be put into experimental use by the Italian State Railways.

Teleprinter Receives and Types Messages Sent to Plane

Operating at 100 words per minute in a British Overseas Airways Stratocruiser on a test flight over the Atlantic, an airborne teleprinter received radio messages intended for the flight crew and typed them on message blanks. The flight was an experiment to test the new device which is aimed at cutting down excessive radio communications over busy airways and increasing the accuracy of communications. The teleprinter is automatic and requires no attention from the pilot other than switching from the British to the Newfoundland frequency midway across the ocean,

¶Forest fires caused by dry lightning may be prevented in the future by seeding the cumulus clouds which are the source of the lightning with silver-iodide particles, if tests now being conducted in northern Arizona prove successful. There are 6000 such fires each year in the western states.

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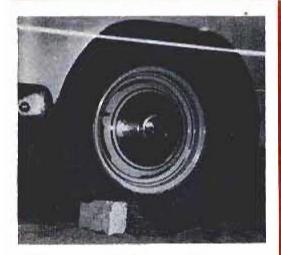
Volume 106

H. H. WINDSOR, Founder

H. H. WINDSOR, JR., Editor and Publisher

Number 1

JULY 1956



Next Month

EVER HIT a brick going 50 miles per hour? Chances are it was harder on the tire than on you, for the tire was engineered to protect you from such punishment. Tires for today's driving must take an incredible beating and bounce back for more. But what about tomorrow's tire? It must be even tougher to withstand the heat of highspeed driving on the superhighways. To make the problem knottier, auto designers want 14 and even 13-inch tires to make cars look lower and sleeker. What will tomorrow's tire be like? A feature next month gives you the real dope on the 100,-000-mile tire, the tire to match the color of your car or your wife's hair, the tire so dependable you can throw away your spare. As a bonus you'll find inside tips from the experts on how to keep your tires rolling for thousands of extra miles.

Sources of further information not listed in the index, starting on page 58, about articles in this issue, frequently are shown in the Where-to-Find-It List prepared for each issue. A copy may be obtained by readers, without charge, from Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11, Ill.

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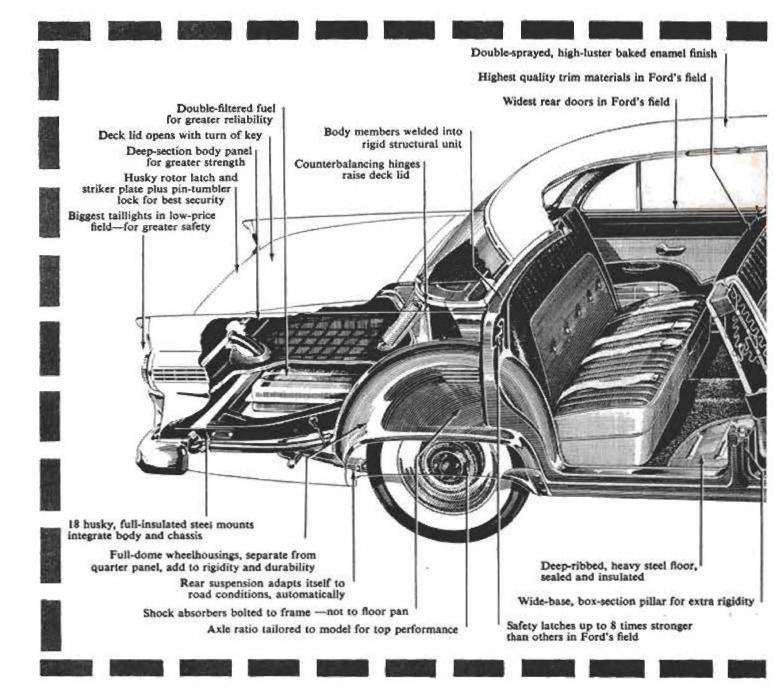
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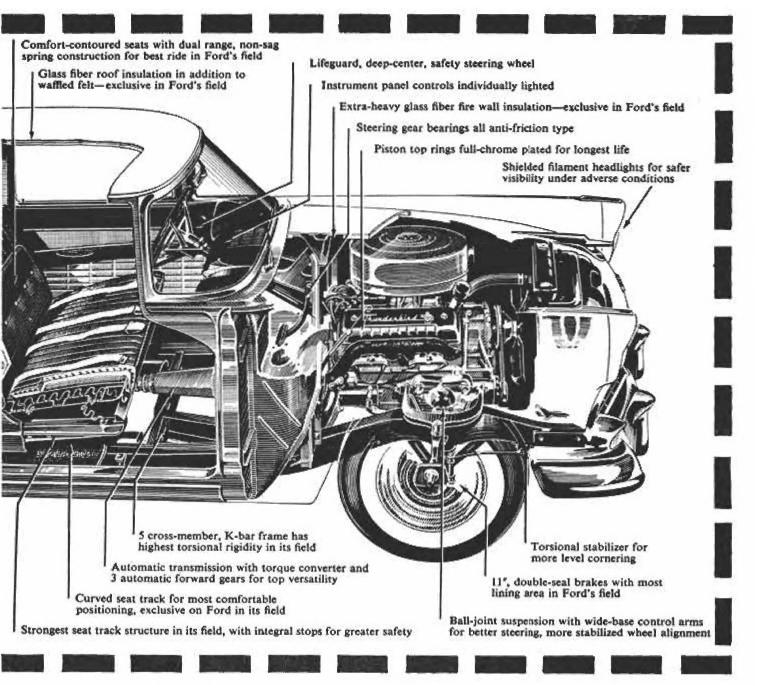
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ACROSS THE DESK



To the Editor:

This is to inform you that MCB does not stand for Marine Construction Battalion.

MCB, which should have a prefix of USN, stands for United States Naval Mobile Construction Battalion. In your April issue the article "The Seabees Build a Town" you referred to us as Marines, which we are not and no part of.

> J. S. McCool, G. A. Jensen, USNMCB 9. c/o Fleet P.O., San Francisco, Calif.

The above letter from Cubi Point, Philippines, was followed next day by this:

Congratulations on the fine articles by Dick Dempewolff in your April and May 1956 issues concerning the Navy's Operation Deepfreeze in the Antarctic.

As this command was quite deeply involved in outfitting and training many personnel engaged in this operation, it noted with great concern the erroneous reference made to "MCB(S)" as Marine Construction Battalion (Special). The MCBs are composed of personnel of the Navy's famed Seabees and are utilized in the construction of overseas bases for the Navy.

Your prompt noting of this misconception will be greatly appreciated by the Seabees of the Navy.

> Thomas J. Doyle, Commander, CEC, U.S. Navy, Chief Staff Officer, U.S. Naval Construction Battalion Center, Davisville, R. I.

Noted, with our apologies to the Navy's Seabees.

To the Editor:

Having worked as a temporary helper in another Christmas rush at the post office, I'd like to express a few thoughts which might help the postal system pay its own way, improve in service and save the taxpayers' money.

First, a little automation is in order. The post office uses entirely too much muscle power and not nearly enough machineryin this day of rocket aircraft, electronic

(Continued to page 10)



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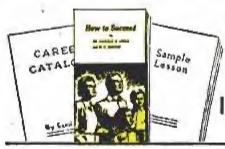
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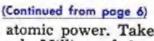
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brains and atomic power. Take the mailbag for example. Millions of pieces of parcel post last Christmas went their various ways in those filthy, inefficient, archaic contrivances called mailbags. The man-hours tied up in filling, emptying, labeling, delabeling, sorting, storing, counting, folding and baling mailbags must be astronomical. If we must have mailbags they should be elastic, with an elastic cord, a slide fastener that lets them open completely at once, and a label that extends a quarter inch from the holder for quick removal. But we'd be better off to junk them entirely.

How can we get along without them? By automating. Building conveyor belts, mail pipelines, first between cities and later within towns themselves, much as a sewer system or telephone net is established. Intercity pipelines, endless-belt affairs carrying mail both ways at once could be built along the railroads, thus simplifying rightof-way procurement as well as avoiding a loss to the railroads of mail revenue. Such a system would require a couple of items long needed. One is a sorting machinewhich could easily be perfected (see PM, June 1953 and October 1955) especially if the other item were adopted—a numbercode address system.

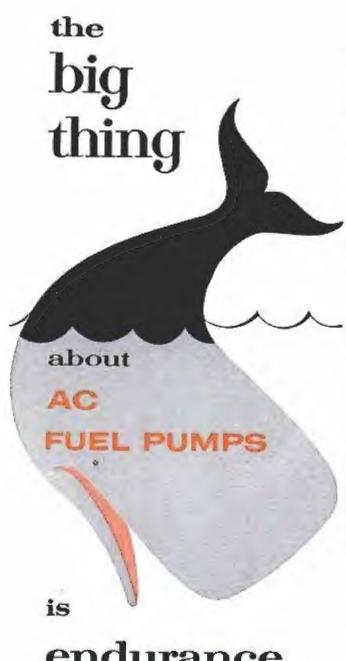
The second basic idea is that the citizen meet more specific obligations than just paying for his stamps. For example, now no standard mailbox is required, no number or name must be visible on the house, the postman is often required to walk far into yards or hallways or business offices to deliver the mail. When a person moves into town he is not required to check in at the post office; the obligation is all on the post office to find out who the new family is, where they live and where they want

their mail put.

Now if five to eight numbers can automatically locate any telephone in our cities, surely a code address system would speed present-day mailbag-type sorting as well as work into a future automatic-pipeline system. Machines can read numbers, and one of the obligations of citizenship should be the acceptance of a code address assigned by the post office to speed mail delivery.

For example, a letter going cross-country by rail today (or the mailbag enclosing it) is probably sorted an average of eight to ten times. This is about seven or eight times too many. I think a pipeline system could be built that would be completely automatic except for rural routes, with something like a small postage meter attached to every in-the-house outlet, for correctly attaching the code to each letter

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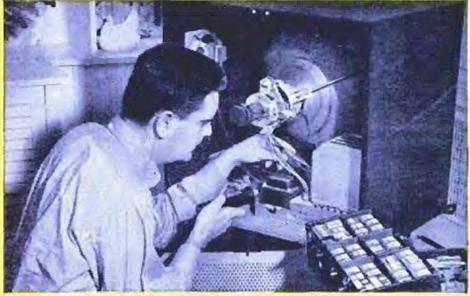
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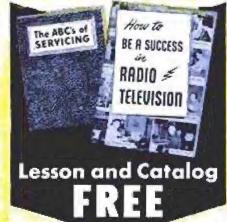
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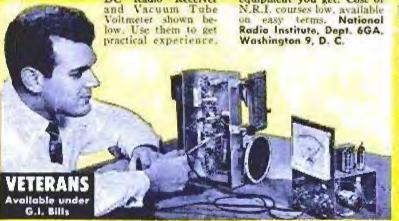
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(Continued from page 10)

or package and incidentally for keeping tabs on the bill, without licking stamps.

A package arriving today in my town must be loaded by hand on a truck at the railroad station, driven to the Parcel Post Annex, unloaded by hand onto a motorless dock truck, pushed inside the building, the bag unloaded again and emptied laboriously (always by hand) onto a short conveyor which spreads it out for the first sorting. Then comes the problem: SW, NE, SE, or NW? The package is tossed into the appropriate tub which, when full, is pushed down to long racks of open-mouthed mailbags-all of which have to be strung on the racks by hand of course. Now comes the big mental waste-which bag, in which rack, for each piece of mail? This one is for 2306 Blank Boulevard. Let's see-Blank Boulevard (not Blank Place, or Blank Avenue, but Blank Boulevard). It should be in rack 3 or 5 or 7. But this package is for the 2300 block, and this sack says 1200 to 2100 only. The next one with Blank Boulevard on it (and seven other streets) says 100 to 1199 only. Hmm . . . And so it goes, for each piece of mail, to be sorted again by the postman out in his truck before it reaches your door. Multiply one town by a thousand and one package by a million, add a few billion letters and you get an idea of the waste of human energy and thought inherent in this system.

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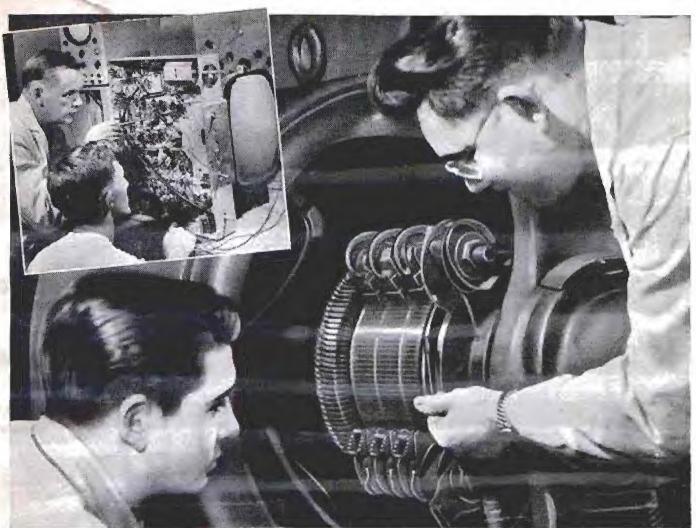
won't be able to handle.

Starr Jenkins, Albuquerque, N. Mex.

To the Editor:

I have read the article in the May issue on recharging dry cells. This was not a new idea to me. During the war I was employed in a machine shop, and the men would depend on me to recharge the batteries for them. I welded brackets to an angle iron, allowing for the contact to the negative side at the bottom. The positive side was made of an insulated plug with a center tip to contact the positive pole of the last battery. Since that time I have recharged many kinds of dry cells-lantern, radio, hearingaid and other types. The important thing to remember is that the batteries should not be allowed to become completely exhausted. We recharged the same batteries many times after I educated the users.

James A. Peters, Allentown, Pa.



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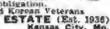
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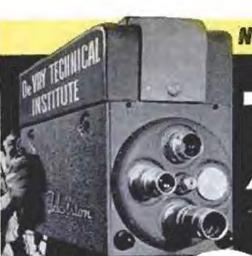
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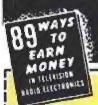
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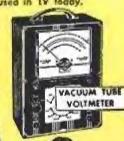
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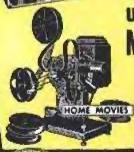


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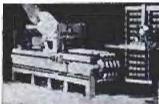
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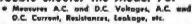
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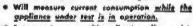
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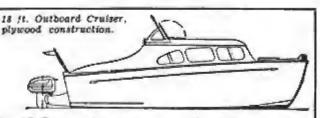
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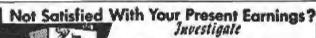
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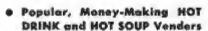
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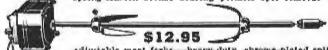


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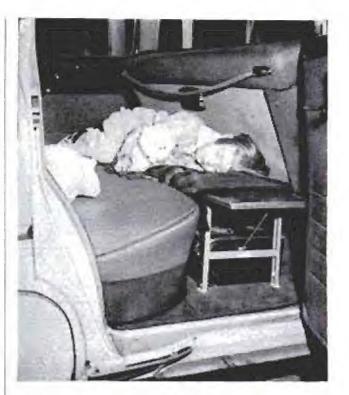
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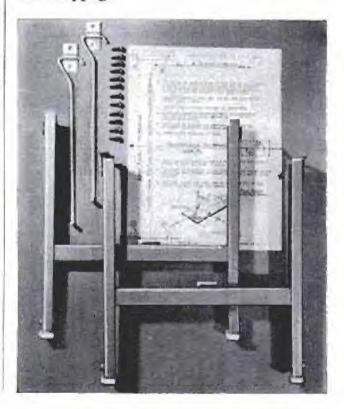
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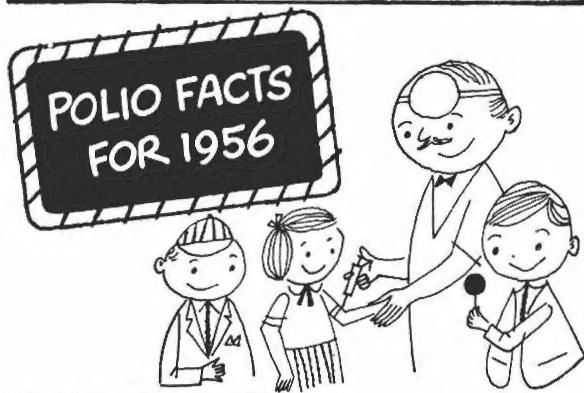
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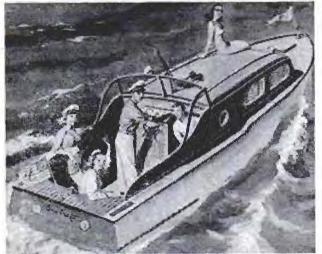
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| | Auto bench provides play and sleeping area. Metropolitan 1500 (American Motors, 14250 Plymouth Rd., Detroit 32, Mich.). Chain-hung truck hopper lowers to ground level Transparent fenders are feature of Farina-styled Aifa Romeo. Window grills keeps locked car cool while parked (Protecto Vent Co., 7100 Brompton Rd., Baltimore 7, Md.) Cradle tips Volkswagen for easier repairing. Engine costs less to make. Sleeping cabin bolts to truck. |

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Plastic Light Plane Has Molded Fuselage

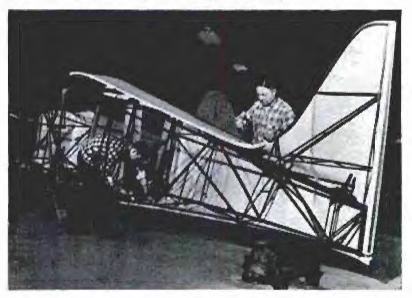
PLASTIC PLANES, long the goal of the light-airplane industry, have become a reality now that Taylorcraft has announced two new models made of glassreinforced plastic. The entire external fuselage, most of the wing, doors, seats, gas tanks, wheel pants, instrument panel and other smaller parts of these planes are made from the plastic. Only the rudder and elevator surfaces are fabric-covered. One model, called the Ranch Wagon, is a four-place job powered by a 225-horsepower engine. The second is an agricultural version of the first, designed for crop spraying, dusting and seeding. It can carry a 1200-pound load of chemicals or other supplies.

The plastic planes can be produced with one fourth of the engineering man-hours, one sixth of the production manhours and 20 percent of the tool costs of a similar standard model. The material is dent resistant, will not rust or rattle, and can be repaired at a fraction of the cost of metal.

Improved operations are a factor, too, since the smooth finish of the fuselage adds up to 12 miles per hour to the speed of the plane. Because all parts are made in dies or molds, they may be interchanged.



Large, law-cost dies are used to shape each half-fuselage in one piece. The plastic is light in weight and helps to insulate cabin



Right and left halves of the fuselage are placed together over a welded tubular frame to make the complete fuselage. Any portion of the fuselage can be made in the die, for replacement of damaged sections. Below, the Topper, Taylorcraft's agricultural version of the plastic plane, can carry 1200-pound load of chemicals





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SCIENCE

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Baby bed with built-in chests at left becomes full-size bed, two chests and desk

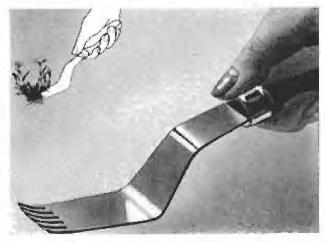
Furniture for Baby Grows up With Him

Now parents can get a baby bed that grows up with the child. The baby bed is built on a platform as big as a full-size twin bed. At one end is a chest of three drawers and at the other is a small closet. The mattress can be placed at five different levels. When the child grows older, the bed is disassembled and becomes a complete set of furniture for the bedroom. Included are a full-size twin bed, two chests and a desk. The railed sides of the baby bed become the head-board of the larger bed.

Weed Puller With Teeth Yanks Out Crab Grass by the Roots

Crab grass and other lawn pests are removed quickly with a small weed puller. The teeth of the tool are slipped into the roots, the handle given a slight downward thrust and the weed is out, roots and all. Plantain, buckhorn, dandelion, Johnson grass and other weeds are removed as easily. Large areas can be cleared in a short time and reseeded without the waiting period required by strong chemical sprays.

It takes 67,000 nails weighing 390 pounds to construct a well-built \$15,000 five-room frame house, according to Wood Research Laboratory, Virginia Polytechnic Institute.



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FREE BIG MONEY SHOE BUSINESS!



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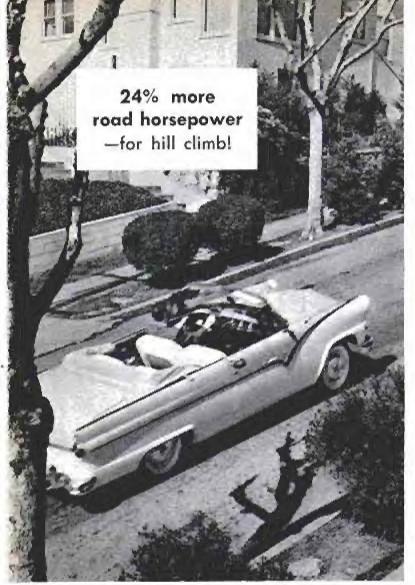
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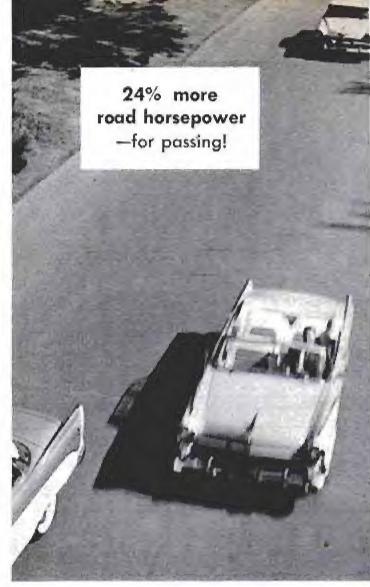
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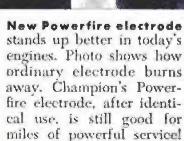
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"Suddenly the explorer's feet slipped from the pipe . . . His safety belt held him over a 16-story drop"

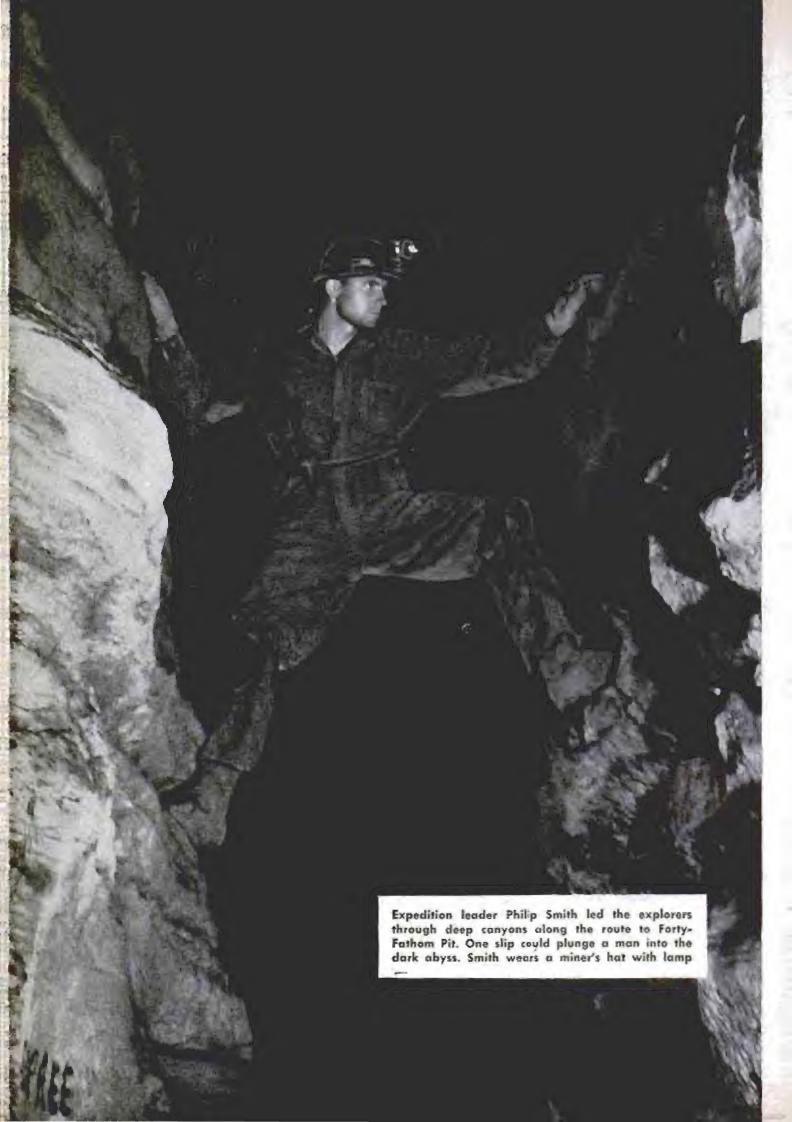
ASSAULT ON FORTY-FATHOM PIT

By Warren Rogers

CAVES ARE SCATTERED around the country in every state except Delaware. An army of 2000 spare-time explorers is constantly adding to the cave lore of the nation—breaking a dark and often dangerous trail for scientists to follow. The National Speleological Society recently announced the discovery of 32 miles of caves under Flint Ridge in central Kentucky. These caves are beyond the one in

which Floyd Collins was trapped in 1925 when seeking a new entrance to famous Crystal Cave which he found in 1917.

Another victory for "cavemen," also in Kentucky, was last year's successful assault on Forty-Fathom Pit, deep within James Cave. This feat was termed "impossible" by veteran rock-climbing experts who first looked into its depths and called it the nation's toughest underground





Cables fastened to the top rung of the pipe bridge hold it in position as the explorers jockey it forward

challenge. From near the top could be seen an inviting but inaccessible passage opening on the far side of the shaft across 30 feet of black air. At first, it was thought that the passage could be reached with standard mountain-climbing techniques calling for pitons (iron pegs) to be driven into crevices in the rock wall. An explorer could hook his safety line into the eye of one of these spikes, then pound in others as he progressed.

But there weren't any crevices in the walls of Forty-Fathom Pit. The smooth, unbroken walls were like concrete—hard and sheer. Philip Smith, a husky, experienced explorer of the big-cave country in Kentucky, Pennsylvania and Tennessee, believed that the pit could be bottomed and crossed, regardless of the experts' opinions. He found 13 cave explorers who were willing to try it with him, then laid plans for an expedition. One of his key men was Burnell Ehman, a machinist and autoparts wholesaler. To him he gave the job of designing and building a rig that would carry at least one man safely to the other side of a deep hole.

Before the jump-off day, Smith assembled the group for a field test of the unusual equipment. At a gorge, whose walls dropped 40 feet into a river, the explorers pushed an insecure-looking pipe bridge toward the opposite cliff. The pipe was ordinary water pipe sawed into four-foot sections, coupled with bolts. Sections had to be that short to fit through a tiny, curving crawlway about 18 inches in diameter and as long as a football field—the only known route to the pit.

One end of the bridge was bent upward at an angle to rest securely on the other side. Steel bars were welded to it so an explorer could pull himself up after crossing, and steel loops provided anchors for a block and tackle as well as guy ropes. Although the sagging pipe would clear-span 30 feet, a block and tackle rigged at the middle increased its maximum safe load to one half ton.

Expedition leader Smith hooked his safety belt onto a welded ring designed to slide along the pipe as he moved. He started across, hanging under the pipe in raccoon-fashion with the roar of water below drowning out all sound. As he moved out, curious bystanders wondered why he chose this precarious method of crossing the gorge instead of using a perfectly



Eyebalts are sunk into the hard limestone walls at the brink of the pit. Safety lines are hooked into eyes

Four-foot sections of steel pipe were bolted together to make the bridge for spanning the pit



Below, this is the three-man survey party that attempted to find an alternate (easy) raute to the far side of Forty-Fathom Pit. They mapped more than a mile but could find no way to cross



satisfactory footbridge less than a mile away. He climbed safely to the other side and yelled back to the group that the pipe had passed the test. The expedition was ready to assault Forty-Fathom Pit.

Eight hours prior to the arrival of the main party, a three-man surveying team entered the cave to map and mark the route to the objective, a quarter mile underground. With an accurate map, the leader could determine whether unexplored alternate routes would lead to the far side of the pit. The survey revealed no passages leading to the other side of the pit.

"Surveyors" Do It the Hard Way

A strange caravan donned miners' hard hats fitted with brass carbide lamps. They shouldered sections of pipe and flexible cable ladders as they filed into the cathedrallike entrance room and squeezed into the opening of the crawlway. Working as a team they relayed their supplies forward, then crawled ahead to repeat the process. By noon, all equipment, including a field telephone connecting them with their topside camp, lay at the edge of the pit. Sledge hammers drove rock drills deep into the hard limestone. Sweaty explorers took turns swinging at the steel bits. Every man was tied to lengths of rope to prevent slipping on the rocky slope tilting into the pit.

Two hours later, four eyebolts jutted out of the wall from their anchors. One team



Working on a tilting slope at brink of pit, one of the men drills hale into ceiling for block and tackle

bolted pipe sections together while another rigged the block and tackle.

Two men moved out to a rock promontory as the pipe clanked forward. They guided the free end of the bridge toward the mouth of the virgin passage beyond them. Rocks pelted down the shaft, ricocheted off the sides and finally, after several seconds, exploded faintly on the bottom.

After three hours of alternately pushing the bridge out and pulling it back to try again, the exhausted explorers shot dubious glances toward Smith. He looked dejected, but there was still tomorrow.

The group spent part of the next morning rigging a 200-foot ladder to explore the bottom of the pit. The ladder, made of steel cables with aluminum rungs, didn't look strong enough to support the weight of a monkey, let alone a fully loaded cave explorer. The leader climbed down anxiously.

In 15 minutes he stood on a ledge at the 197-foot mark. Below him the shaft continued downward. He estimated the distance from his position to the apparent bottom at 50 feet, but the explorer was at the end of the ladder. He had descended deeper into a Kentucky pit than anyone before, proving Forty-Fathom Pit more than a hundred feet deeper than its nearest rival, 139-foot X Pit in nearby Floyd Collins' Crystal Cave.

When Smith returned from his recordbreaking descent he rested while others prepared the ropes for one last attempt. Backs bent into the ropes. Veins stood out on a dozen foreheads. Through brute force more than luck, the pipe inched into position. They tied it off, then prepared to send a man across.

Everyone held his breath as the man started across. The bridge was holding, just as it had during the test. Suddenly the explorer's feet slipped from the pipe! With a loud metallic sound he stopped, dangling beneath the pipe like a trapeze artist. His safety belt held him over a 16-story drop. After resting a moment, he hoisted his legs over the pipe and continued his journey.

On the other side he pushed into the blackness. He returned shortly to announce the discovery of another pit around the bend in the passage to the right. Did Smith want him to continue exploring? Smith did, but unless they cleared out immediately, they would all be late for work. The explorer agreed to return after he had written a note for future conquerors to read on the far side of the pit. The man returned; they started out, dragging equipment, pipe and rope behind them.

The week-end cave explorers had run into their old enemy: Time. To be sure, they'll return to James Cave and, time permitting, will press even deeper into the black, uncharted passage. But they won't forget the first time they executed the horizontal and vertical conquest of Kentucky's deepest underground pit. **



Outboard-Powered "Aquatic Sports Car" Hits 30 Miles Per Hour

Automotive design distinguishes a glassfiber "aquatic sports car" that is powered by an outboard motor. The boat has a downswept hood, French headlights, high tail fins and a sleek interior. It carries four passengers and comes equipped with radio, docking lights, running lights, vinyl upholstery and plastic-foam flotation. The craft is 14 feet long, has a 64-inch beam and a 24inch depth and can be fitted with a 40horsepower motor that gives it a top speed of 30 miles per hour.



Metropolitan 1500

With 24 percent more power, the new American Motors Metropolitan has a top speed of 78 miles per hour and goes up to 40 miles per gallon. It has a larger engine of 90.89 cubic inches or 1489 cubic centimeters, hence the model designation "1500." Compression remains 7.2 to 1. Horsepower is 52 (up from 42 last year). Style changes include the grille, two-tone paint with a chrome separator and a flattened hood (previous models had a simulated air scoop).

Dial-a-Stamp Dispenser Installed in Post Office

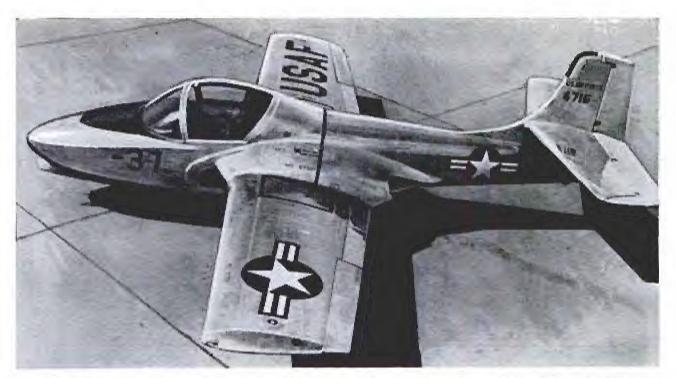
You dial the number of stamps you want on a machine recently tested at New York City's General Post Office. The unit, which costs \$4000, delivers two-cent, three-cent and airmail six-cent stamps. In addition, it makes changes and even says "thank you." The customer places a nickel, dime or quarter in the slot before dialing.

Night-Glowing Bike Tires Increase Road Safety

Bicycle tires that glow in the dark make for greater safety on the road. Glowing colors—red, blue or green—cover the entire tread and extend into the tire sidewalls for greater visibility. The color is built into the rubber and will not wear out, fade or scuff during the life of the tire.



POPULAR MECHANICS



First of the Cessna T-37 jet trainers intended as spotters for atomic artillery will be delivered in October

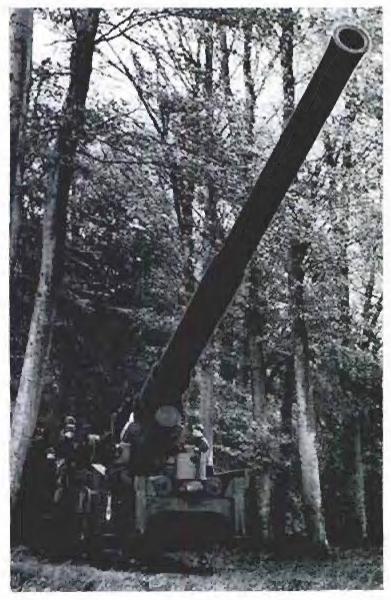
Jets Used as Spotters For Atomic Artillery

PREVIEWING the speed, power and terror of atomic warfare on the ground, the Army has been given top priority in the production of T-37 jet trainers for use as the "eyes" of its 280-millimeter atomic cannon. Up to now, the Army has been using L-19 and L-20 scout planes for artillery spotting, but the top speed of these little ships is about 100 miles per hour—too slow to enable them to spot their targets and get out of the area before the atomic blast.

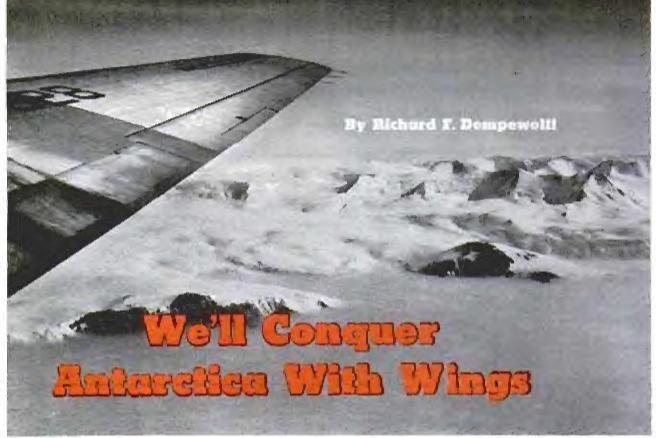
"The speed with which atomicage forces will assemble, strike and disperse," an Army spokesman declared, "makes it essential that we be able to identify a target within minutes and destroy it before it disperses."

The T-37, with a top speed of 395 miles per hour, can get in and get out in time to do the job and stay alive. Furthermore, one T-37 can spot targets for a battalion or more of the big guns covering a target area of several hundred square miles.

The T-37s, which will be on loan to the Army from the Air Force, were chosen over the older but faster T-33 because in addition to a good top speed, they can be flown slowly enough for spotting. Atomic artillery, like 280-millimeter cannon below, is designed to hit rapidly moving targets such as tank concentrations



JULY 1956



National Geographic Society photo

Fourteen-thousand-foot peaks of Britannia Range, 90 minutes' flight from McMurdo, push through clouds

WITH A SPECTACULAR blue flash, eight jato bottles clamped to the sides of Comdr. J. W. Entrikin's P2V Neptune cut loose. Standing in hard-packed snowdrifts on Antarctica's McMurdo Sound, we watched the heavily loaded plane surge forward as its boat-size skiwheel landing gear skimmed the ice runway. The hot blast vaporized the snow surface of the strip. Frigid polar air instantly condensed the vapor and left a fog curtain one half mile long behind the orange wing

tips of the twin-engine patrol bomber.

"Buno 122465" was off on the fourth of ten historic flights made last January over the south polar ice plateau. As south polar flights go, it began in routine fashion. Climbing above the chaos of crevasse-ridden glaciers and 12,000-foot mountains west of McMurdo, Entrikin and his crew of five winged 1250 miles beyond Wilkes Land, into an unexplored region dramatically called "the area of inaccessibility." If you balanced a map of Antarctica on a pin

point, the region in a 1000-mile circle around it would approximate the boundaries of this no

man's land.

At a control panel behind the P2V's navigator compartment, photog-rapher T. H. Stallings flicked a switch occasionally. The triple-lens horizon-to-horizon Trimetrigon cameras in the plane's sleek belly automatically photo-mapped - with proper overlap—the bleak mountains and endless, featureless snow prairie below. Every half hour, navigators took sun fixes, using a periscope sextant that poked through a special socketlike hole in the overhead. They made observations through an eyepiece inside the plane,

Rear Adm. George Dufek, left, commanding officer, checks chart of expedition's polar flights. Captain Ketchum, deputy commander, is with him





Ice for the runway at McMurdo Sound was tested for thickness with a seven-foot motorized chain saw

Qualified fliers drifted in and out of the cabin, taking turns at the controls and watching the radio altimeter to make sure the high plateau wasn't creeping up beneath them. More than one plane has landed on it in full flight. Mostly, they flew on automatic pilot or, as they put it: "We've turned her over to George."

Back aboard the Navy cargo ship Wyandot, used as air-control center at its mooring on the northern edge of Mc-Murdo's bay ice, regular position reports from the plane crackled through. For six unbroken hours, crews in the radio shack

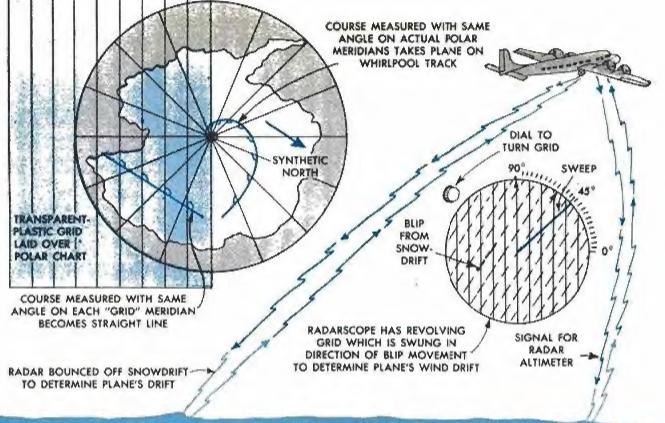
and CIC (Combat Information Center) listened drowsily to the dit-das coming in, and watched the glowing green radar sweeps in the darkness. Somebody went out for a container of coffee to break the monotony.

At that instant, every man in CIC leaned forward, electrified. The unmistakable Morse SOS...SOS...flooded earphones and loudspeakers. Pencils flew across pads as the grim words spelled themselves out. A thousand miles out over the 12,000-foothigh polar plateau. Entrikin's starboard engine was failing. Maximum altitude for a

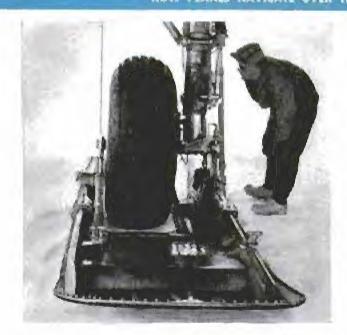


the antarctic operations, the Adelies represented the "Sidewalk Superintendents' Club," as groups of them continually wandered up to see what was going on. The Otters were brought down to site in ships, stripped of wings and other parts, then unloaded and assembled for work

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HOW PLANES NAVIGATE OVER THE POLAR PLATEAU



Above, crewman examines ski-wheel assembly on a

loaded P2V on one engine is only 6000 feet. "What are the chances for rescue?" an operator asked.

"Zilch!" somebody muttered.

On board Buno 122465, men were battling to keep the crippled plane flying. Their situation seemed hopeless. Only a few hundred feet below stretched an eternity of featureless, windswept snow that no human foot had ever trod. They were dropping toward it—fast. Temperature was five be-low zero. They knew no ground-rescue party could travel the 1000-mile round trip across Antarctica's hazardous, unexplored interior to reach them. Their 45-day survival rations and equipment couldn't see them halfway if they tried to "walk out." Another long-range ski plane might land on the soft snow. But chances were it would never take off again. No one has yet





One of Deepfreeze's plane-crash victims is brought back from survival tent where he had stayed 14 hours

dared land a heavy plane deliberately on the polar plateau.

Loose Gear Overboard

"The engine sputtered and backfired violently every few minutes," Entrikin reported later. "She gobbled precious fuel at a rate of 1400 pounds per hour. Revolutions per minute fluctuated wildly." Entrikin jettisoned his bomb-bay gas tanks and ordered all loose gear thrown overboard. Out went personal belongings, cooking gear—everything but precious radio and survival equipment. Slowly the radio altimeter crept up again. Heaters were turned off to save 30 gallons of fuel per hour. Within minutes, canteen water in the cockpit froze solid and crewmen shivered in their insulated clothing.

For 5½ hours it was a touch-and-go race with certain death. Back at McMurdo you could taste the tension. Emergency crews scurried around the ice to marshal survival equipment, refuel and hang jato bottles on search-and-rescue planes. All aircraft frequencies went silent to provide clear channels for the cripple. Grim-faced men trooped through air control for orders, and departed to carry them out.

A four-engine Skymaster and a second Neptune roared away to find the wobbling plane. A few minutes later everyone breathed more easily. The scouting planes had homed in on a speck in the sky 120 miles westward. It was Entrikin and crew, skimming the Antarctic highlands. Some minutes later Entrikin shot a neat one-engine landing on the ice runway, and the shivering crew was helicoptered to the ships to thaw out. The Neptune's gas tanks contained 150 gallons—about 20 minutes more of flying time.

Long-Range Aerial Probes

Entrikin's reason for being 1000 miles out over the heart of Antarctica was not just curiosity or sightseeing. This flight, like the nine other long-range probes made by Operation Deepfreeze pilots, was part of a 10-day crash program of aerial exploration and mapping that covered about a third of the southernmost continent's 3,000,000 square-mile unexplored interior. Most of the desolate reaches over which they flew had never been seen by man. Tracks included four passes over the South Pole, transcontinental stabs toward the coastal ice of the Weddell Sea, on the opposite side of Antarctica, and into the far reaches of Wilkes Land below the Indian Ocean. More than 22,000 feet of aerial film mapped about 1,000,000 square miles for-according to one Navy photographer—"the big Antarctic picture." Once assembled, these pictures will help cartographers fill some of the vast blanks in current charts of the silent continent.

Deepfreeze's air fleet, Air Development Squadron Six (VX-6 for short), under Comdr. Gordon K. Ebbe, consisted of two four-engined R5D Skymasters, two helicopters, two ski-wheel P2V Neptunes and



Scarlet trail flags were planted in holes in the ice and frozen in place to outline the runway boundaries



Take-offs were impossible for the big planes without jate. Four bottles were mounted on side of each plane

four ski-wheel deHavilland Otters. On board the ice breakers, operating from fantail landing platforms, were the aerial jitneys of the expedition—four Sikorsky seven-man helicopters of Helicopter Unit Two, captained by red-bearded Lt. Comdr. Bill Shockley.

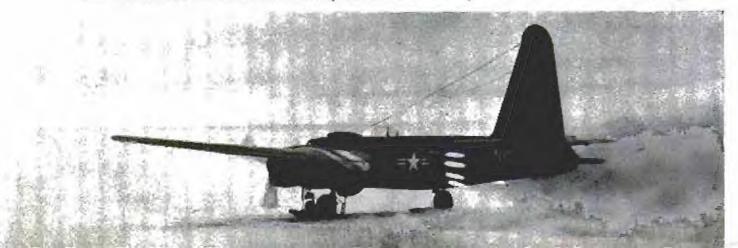
Otters and helicopters rode ships to Mc-Murdo's snowbound mountains. The bigger planes made history. Winging south from New Zealand, they had flown the 2300 miles over wild polar seas on the first nonstop flight ever made to Antarctica from another continent.

To prepare for the fly-in, a special site had to be found and made into a safe home base. "We need sound, flat ice for a two-mile run, with four inches of snow on top to allow braking and prevent skidding," Commander Ebbe explained as he took off in one of Bill Shockley's choppers to shop for his airport.

Forty miles south of the ships, only 800 miles from the pole, they found it—a vast ice prairie at the base of 13,500-foot Mount Erebus. Here, working in minus-20 degree weather, with a 40-mile wind howling down from the slopes of the steaming volcano, Seabees readied the strip. A seven-foot chain saw driven into ice at strategic

(Continued to page 224)

Jata is smokeless, but heat melted snow particles which instantly condensed in extreme cold, leaving a trail





Conventional X-ray tube above patient directs beam through him to register electrostatic image on plate



General Electric photos

Electrostatic image becomes visible when sprayed with powder in developer. Below, picture has 3D quality

Speedy "Blackboard X-Ray" Uses Charged Plate for Film

X-ray pictures are obtained in 40 seconds with a process that uses dry metal plates instead of film. A self-contained, portable unit designed for Civil Defense supplies its own power and is unaffected by radioactivity that contaminates X-ray film. The plates can be wiped off and reused.

A conventional X-ray tube is used. The image is produced on a selenium-coated aluminum plate which is charged before exposure. The X rays, passing through the body, discharge the plate partially and variably depending upon the varying densities of bone and tissue in the patient. The result is a latent electrostatic image on the plate, which is then made visible in a unit which sprays the plate with powder that adheres heavily or lightly to the pattern, like iron filings around a magnet. The fast-acting "blackboard X-ray" is called xeroradiography.



Gun Camera With Automatic Lens to Take Jet Combat Pictures

Better motion pictures of aerial combat will be taken by jet fighters with a new gun camera which has a lens that automatically opens or closes according to light conditions. When engaged in a dogfight, a plane may be pointed at the sun one moment and at dark terrain the next. In older cameras, this meant part of the film was underexposed and part overexposed. In the new camera, the illumination received through the lens is automatically compared 64 times each second to the light from a reference lamp inside the camera. If there is a difference in intensity between the two, the lens diaphragm changes to the proper opening to make them match.

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Arches of steel tubing support tent, eliminating center pole and giving high headroom and an unusual amount of usable space. Tent is made of forest-green water-repellent duck and has plastic-screen windows in sides

Rounded-Top Tent Has No Center Pole

Taking a cue from the covered wagons of the pioneers, an inventor has brought out a new camping tent with rounded top and no center pole which is supported by rounded metal arches stuck into the ground. The entire frame comes apart in short pieces which are easily carried. The ends of the tent can be left open, or closed during bad weather. The packed tent makes a compact 18pound shoulder pack.

Speedy X-Ray Analyzer Spots Unknown Materials

Unknown materials are identified quickly with an X-ray diffraction instrument that has a built-in proportional counter and preamplifier. No geiger counter is needed. An orienting device makes it possible to identify single crystals of matter and to analyze fibers and wires by the reflection method. A helium-tunnel assembly greatly extends fluorescent analysis, increases sensitivity and permits accurate qualitative analysis of such elements as sulphur, chlorine, potassium and calcium. The unit is in production.



One-Man Helicopter Can Be Folded Up

Developed by the United States Navy, the XRON-1 Rotorcycle is a small, one-man helicopter that can be folded into a small package for easy transportation. Wtih the pilot aboard, the Rotorcycle weighs only 500 pounds, but despite the light weight, has such advanced features as a contrarotating rotor system. The ship can accommodate engines from 40 to 75 horsepower. Flight information is at present restricted, but the test pilot described it as the easiest-to-fly helicopter he's ever handled. Production for the first two years will go to the Navy. After that, a company spokesman said, it may be possible to make the midget machines available to the public.



THE JAIL THOUGHT

By Jack B. Kemmerer

ULTRAMODERN in all respects, the new eight-floor Los Angeles Police Building makes available to the city's police department the most scientific building ever used by a law-enforcement group.

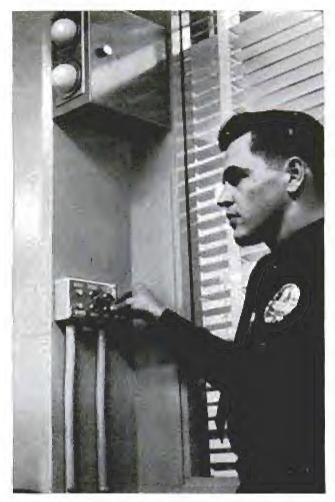
Termed the best law-enforcement facility in the world by experts, the building is attracting attention from police officials in all parts of the United States and Canada.

Built of reinforced concrete, with precast-concrete partitions being used in many cases, the building's eight floors plus basement contain 407,826 square feet of floor space. There are 25,000 square feet of glass windows, all fixed in rigid frames and the building is completely air conditioned, with 300,000 cubic feet of air moving through the structure each minute.

The exposed ceilings are false baffles, with almost four feet of space to the bottom of the floor above. All wiring, heat

Spectrograph analyzes inorganic materials, has proven valuable in hit-and-run cases where make and model of car can be identified from a bit of paint





Doors throughout building are push-button operated and only two men have keys, which are seldom used

All exits to central jail have double doors. The second cannot be opened until the first has been closed



and air-conditioning ducts, and water pipes are contained in this easily accessible space.

Show-Ups in Auditorium

The new police facility contains many unique installations, most of which were specifically designed for the building. These unusual features are located throughout the building. On the first floor is the modern auditorium which is perhaps the most versatile installation in the building. With its seating capacity of 453, it is used for conducting show ups, as a classroom and as a motion-picture theater.

The central jail lies directly behind the auditorium and was placed in this location so that ramps could be built between it and the auditorium for easy movement of prisoners to and from the show-up.

First Jail in 1860

In 1860, just 96 years ago, the jail of Los Angeles was located a few blocks from where the new police facilities building now stands. This jail, built of adobe, had a large log running the length of the detention room. Prisoners were chained, and by driving a large spike through the chain into the log, the prisoners were kept from escaping. The new jail is a far cry from those days and is a paradise in comparison to the old adobe building. Today, there are no bars on the windows. Instead, they are glazed with a nonbreakable tempered glass that has more than enough strength to hold the strongest man. This jail is probably as near escapeproof as it is possible to build one.

Nerve Center

Also on the same floor is the nerve center of the police department—the Communications Division. Special thought was given to this custom-built communications installation, since rapid and accurate communications play an extremely vital role in modern-day law enforcement. This is especially true of a city like Los Angeles, with the largest area of any city in the world to patrol.

Located on the second floor is the very busy division known as Records and Identification, or as the department refers to it, the "Memory Room." Probably the one thing required above all others by the officer in the field is the availability of records. Without these, he cannot tell who is wanted, nor can he tell, for example, if an abandoned car he is investigating is stolen or not. An important feature of accurate, readily accessible records is the fact that they can be used to establish a pattern—known as the modus operandi or "M.O." Once this pattern has been established, it is often possible to determine exactly who



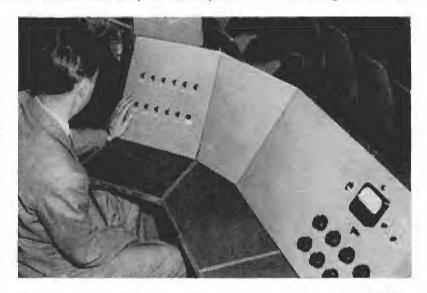
Show-up stage is protected by wire screen. Above, the lineup as seen by the audience through the screen

the perpetrator of a crime is before he is caught. This division handles almost 4000 inquiries daily concerning individual records.

The fourth floor contains a division that probably has brought the greatest amount of international attention to the department-the Scientific Investigation Division. This division has long been recognized as one of the finest in the world and is also the largest of any police department, occupying the entire floor. The men working in the laboratories located here are top experts in their fields, and the names of Lts. Lee Jones and Ray Pinker have become household words to those engaged in law-enforcement work all over the world.

Moving up to the seventh floor, we find the Planning and Research Division. This division has many responsibilities. It is their job to seek out problems, then find the solutions. They are constantly at work, probing into the many facets of law-enforcement work.

A vital part of the division is the Statistical Unit. This was the first unit of a police department anywhere to install a complete array of IBM equipment and make the fullest use of it to solve their problems.



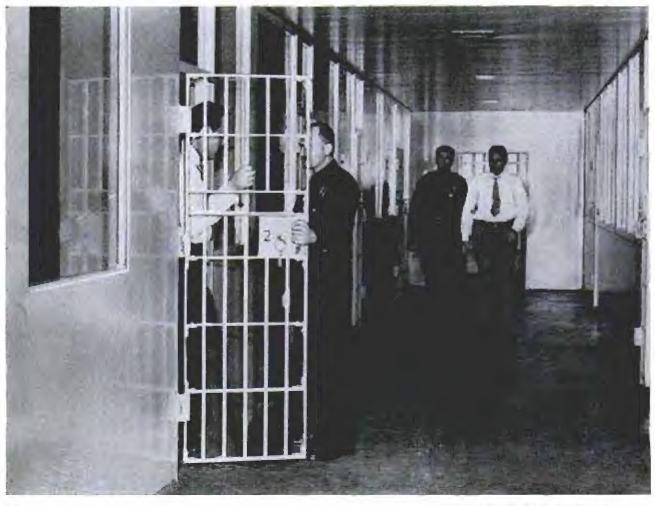
Above, a control console at rear of auditorium re-creates lighting conditions under which suspects might have been seen. Below, view from stage, showing wire screen. Suspects cannot see audience





Complaint board is entirely automatic. Incoming calls are sent electronically to an open position. If all positions are busy, a call bank stores them until one is open, then releases them in the proper sequence

Special tempered unbreakable glass is used throughout jail to replace steel bars except on cell doors, permitting better supervision with less personnel. Soft Neoprene floors in detention cells reduce self-injuries



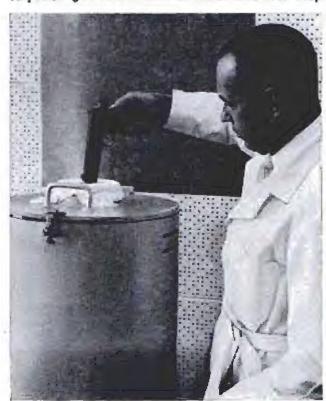


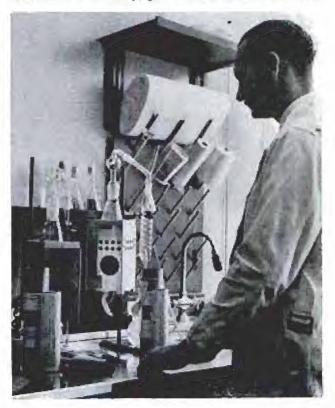
The Property Division, on the ground or basement floor, handles more than \$4,000,000 worth of property annually. It is called on to handle all items of evidence, from furs to ice cream to pocketknives and guns. A large walk-in cold vault is provided to safeguard all perishable goods. The department once stored a partially eaten ice-cream bar in dry ice for several

Bullets for ballistics tests are acquired by firing suspected gun into a tank of water nine feet deep months. This bar was vital evidence in a case in which the teeth marks in the bar were used to establish the identity of an individual.

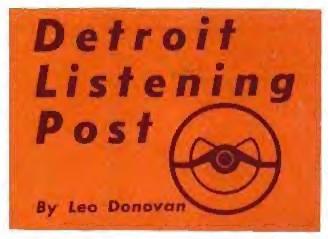
Surrounded by the most modern equipment, and with all important divisions located within easy reach in one building, the Los Angeles police can provide better law enforcement for a growing city. ***

Balloon-blowing test given drunken driver is rechecked in laboratory, gives alcohol content of blood





JULY 1956



I F YOU EXPECT revolutionary changes in automobiles in the near future—don't. At least, not at General Motors. No matter what the ads say after the new cars are out.

You have the word of Harlow H. Curtice, President of General Motors. Curtice said recently that we should not expect revolutionary advances "because the hundreds of millions of dollars we spend annually for new tooling represent a tremendous risk. If we are wrong in anticipating the likes of the public, it could be quite disastrous. The public never demonstrated in the past a willingness to accept so-called revolutionary changes, but is quite willing to accept changes on an evolutionary basis."

So there you have it—the cars of the future will change gradually, not radically.

Asked if he would consider the free-piston engine (which GM has been publicizing widely) a revolutionary change, Curtice said he thought it would be, but that he didn't expect it to be available for 10 years or so. He definitely discounted any change to rear engines in the foreseeable future.

Oldsmobile is installing an unbelievably complex cylinder-head assembly machine for production of its 1957 engines. On display at the GM Technical Center dedication, the machine made it apparent that no startling changes are coming in the 1957 Rocket engines. Unused stations on the assembly machine are set aside for future design changes (such as fuel injection and valve rotators, for example) but they obviously won't be in time for 1957.

Superprestige for \$8000

There are still some who insist that 1957 will be a revolutionary year. Insiders say the Cadillac Eldorado Brougham will be a startling and exciting car in appearance and performance. It is to be a superprestige car, selling for about \$8000 and built in limited quantity. Some think it may be sold as a "loss leader" for prestige purposes. Look for the compound-curve windshield, one that sweeps up into the roof as well as

around the sides—the receding-hairline approach to windshield design. If the public takes to it, this will probably be a feature of the 1958 General Motors family of cars.

Certain low-volume Chrysler cars are expected to have the new windshield and if everything goes well, the new shape will be standard by 1958.

Chrysler will look different, but don't expect a shift from the wedge-shaped pattern it pioneered this year. It is the trend of the future, Chrysler maintains. Tailfins are coming on other makes—Ford, for instance.

Pontiac's unhappy showing in the General Motors' sales picture this year could result in radical (if not revolutionary) changes. Informers say the only unchanged part of the Pontiac sheet metal will be the roof. The body shell will be the same, but look for new grille, fenders, hood, taillights and trunk deck. The ever-present chrome striping (Silver Streaks) will run along the sides and will be a single wide band instead of parallel stripes. By 1958, this identification device may be extinct.

Cheaper and Better

The 1957 Eldorado Brougham may be the first American car with air-oil suspension. But the whole industry will move that way shortly. Reason? In volume, it is expected that air-oil will be cheaper than torsion bars and better, too. When something's cheaper and better, it's bound to come!

Soon Hudson and Nash will stop competing with each other. Probably Nash will take the upper-medium-price field. Hudson the lower-medium-price field. The Rambler may soon be a separate name, not the Hudson Rambler or Nash Rambler, but just the Rambler.

The power race continues—and will. The biggest cars are running out of power. Some multiple-carburetion costs are fabulous. Fuel-injection systems may soon be as cheap and certainly will offer the added power margin needed for these final years of the reciprocating engine.

If the '57 Eldorado has fuel injection as is now being guessed, you can be sure that the Continental or Lincoln will have it. And that will likely mean that the Imperial and maybe the Chrysler 300 will have it too, although company officials deny this.

Maybe we've reached the end of the dream-car era! One major company that had a dream truck on its schedule for fall showing (it was already being worked on in an Italian body shop) has scrapped the whole project. The industry may have agreed that too much dream-car publicity has made current models unexciting and has contributed to sagging sales. We'll see.



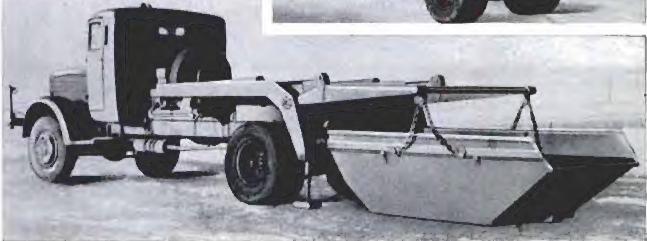
Transparent Fenders Are Feature of Farina-Styled Alfa Romeo

Racing drivers will be able to watch the front tires of an Alfa Romeo sports car with a Farina-styled body. A transparent section in each fender permits viewing the tread condition, at least while the pavement is dry

Chain-Hung Truck Hopper Lowers to Ground Level

Loads are lifted from ground level by a German dump truck with a hopper hung from a pivoting frame. The frame, driven by hydraulic cylinders, pivots in a 120-degree arc to lift the hopper onto the truck. A support swings down behind each rear wheel to prevent the truck from tipping backward. The chain-hung hopper can be loaded by hand. One can be left at the site to be filled while the other is on the truck.





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School for Forest Rangers

By William Gilman



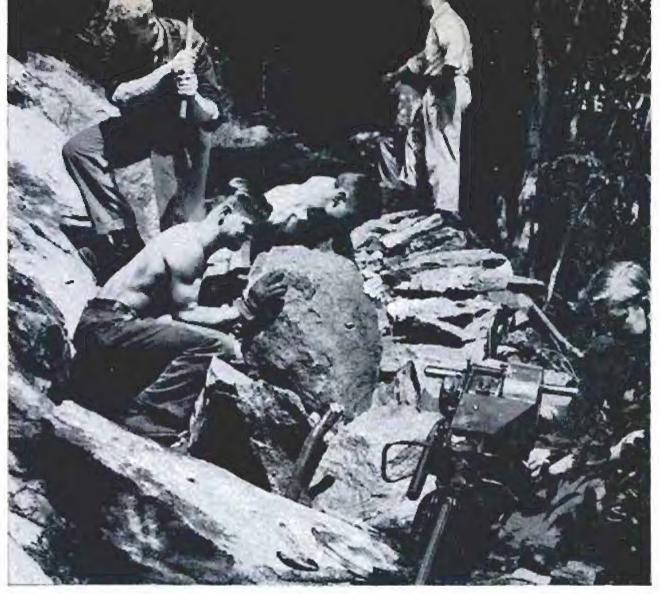
WHEN DRIVING along Route 3 through the heart of the Adirondacks, it's easy to bypass the tiny hamlet of Wanakena, N. Y. And it's hard to realize that America's oldest and biggest school of its kind is nearby. Despite its standing, however, the Ranger School run by the

State University of New York's College of Forestry has only 60 students. Its very specialized job is turning out young men trained to guard and administer our forest lands.

The campus, a neatly landscaped cluster of buildings beside the Oswegatchie River,

Tyro rangers above march in step with log hung from hooks. Below, they break up rock in building a trail





After rocks have been broken up, some are rolled out of the way and others are saved for building trail

is surrounded by a 2300-acre forest preserve.

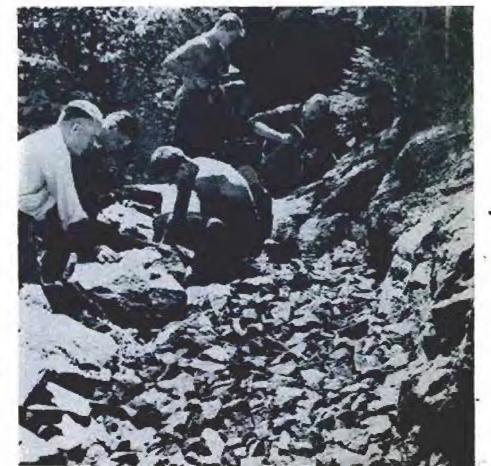
Here students learn fire fighting, surveying, tree growing, logging and all the other skills needed to manage a park or a commercial tree farm. Most of the trainees are fresh from high school, although the top age limit is 35.

Some alumni of the school have drifted from forestry into odd but related pursuits. One has become the uncrowned king of Anticosti Island in the St. Lawrence River, producing mountains of pulp wood, with canned deer livers for a sideline.

Another cabled back to his company's New York headquarters from the jungle in Venezuela, ordering a rush shipment of water pumps with internal piping big enough "for alligators to pass through."

And there's alumnus Otto Pike in Puerto Rico who grows orchids in his grapefruit orchard.

Smaller pieces of rock become road bed of trail and will stop washouts. Big flat pieces laid along edge form retaining wall





James Dubuar, school director, aids students practicing surveying. Mapmaking is another standard course



Prof. Orrin Latham shows students how to lengthen their reach with pruning saw bolted to ax handle

Among the visitors to Wanakena are professional foresters from as far away as Finland and Thailand, interested in seeing this school that turns out qualified forest rangers in only 11 months. There are no vacations during that period, of course, and little time for teen-age horseplay.

In off hours, the candidates go fishing, hunting or canoeing, but genial James F. Dubuar, the school's director, is quick to point out that this is a place for learning a highly specialized trade, not a haven for would-be Davy Crocketts. Oddly, most of the students come from cities and larger towns, not from the backwoods or even rural regions.

Graduates scatter all over the world in their profession, which is hungry for recruits. Even in the depression the Ranger School was able to place 80 percent of its graduates immediately. Those "old grads" are now sending their sons and nephews back to become chips off the old block.

School mascots Johnny and Billy Hensel learn the crosscut saw under guidance of father, a faculty member





Self-Propelled Water Skis Skim Along at 40 Miles Per Hour

You can reach a speed of 40 miles per hour on a pair of "motorized water skis" recently shown in San Francisco. A 16horsepower outboard motor is mounted on a pontoon between the skis, providing plenty of power. The craft is steered by the rider's shifting his weight and tilting the pontoon, which automatically turns the motor. The rider stays upright by grasping the crossbar of a metal standard.

Lightweight Knee Rest Padded With Foam Rubber

Gardening and any other work that requires kneeling is eased with a lightweight knee rest padded with foam rubber. Chrome-plated risers on each end act as handles and as supports in getting up or down. A trough at the front holds seed packages, gloves and tools. The 17-inch wide unit is especially useful in waxing, cleaning, laying or repairing floors.

Smithsonian Has Termites

More than 230,000 specimens of termites from 1286 distinct species are under glass at the Smithsonian Institution, most of them contributed by Agriculture Department entomologist Dr. Thomas E. Snyder.



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Tent That Sleeps Seven Unfolds From 39-Pound Package

Tentmakers have come up with a model equipped with a screened-in "back porch." Cots can be placed under this canopy to increase capacity to seven persons. The tent



proper has six-foot-high walls, four insectproof windows which open or close from the inside, canvas floors and a zippered, insectproof front door. Lightweight aluminum telescoping poles support the tent, which weighs only 39 pounds and will fit into a small section of the car trunk.

Squeeze Bulb Starts Siphon

You don't get a mouthful of gasoline when you siphon fuel with a special tube. You just insert the tube in the fluid, squeeze the air from a rubber bulb, and open a valve to let the fluid run. With it, boat motors and garden equipment can be fueled from an auto tank, and aquariums and sink traps can be drained. The siphon is corrosion-resistant and it is not damaged by acids.

Nonsinkable Catamaran Can Be Powered by an Outboard or Paddle

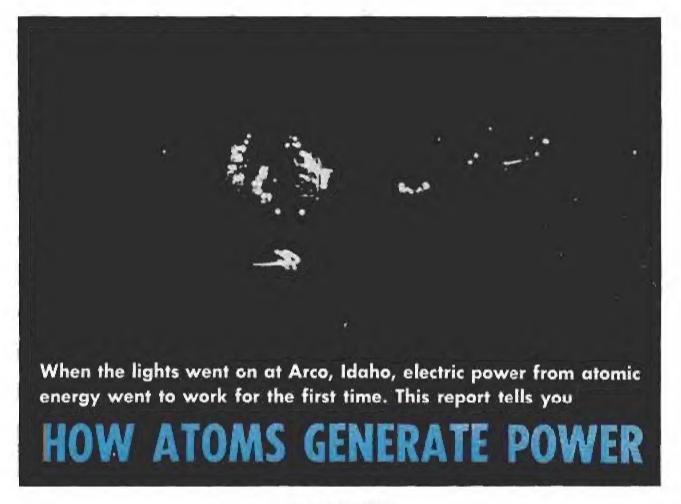
Fun and safety are built into an eightfoot catamaran that features two nonsinkable hulls. The hulls are made of marine plywood sealed with rubber and do not require yearly calking. Two models are available, one to accommodate one double

paddler plus passengers, and the other up to three double paddlers kayak style. Both come fitted with a motor support for outboard operation. Each is equipped with two seven-foot oars, four canoe paddles and a ten-foot double-bladed paddle.





90



By Rafe Gibbs

ON THE NIGHT of July 17, 1955, thunder rolled down from the Lost River Mountains and lightning whipped across Arco, Idaho. Then, like candles snuffed out by the wind, all the lights in the town went out.

A rancher in a cafe struck a match and held it in front of his weathered face; patrons in a local movie theater whistled; a mother, bathing her children, wondered if she should get out the Christmas candles. But within a minute the lights went on again and Arco was back to normal—or so the folks thought.

What the rancher, the theater patrons and the mother didn't know until afterward was that the storm hadn't been responsible for the power interruption. The interruption was manmade and, for more than an hour afterward, this little part of the nation

Pictured at top of page is Arco, Idaho, on night it was lighted by atomic power. Below, same view in daylight
Argonne National Laboratory photos





Above, a model of Argonne National Laboratory's experimental boiling-water reactor, which is now being completed. It will generate 5000 kilowatts

was making history as the first town in the world ever to be powered and lighted by atomic energy.

Only a few of the community's 1200 inhabitants were in on the secret when the power switch was made. But even when word of the experiment began to leak out, the townspeople were not too impressed. Arco has long been accustomed to strange phenomena. It is located near the Craters of the Moon-weird black lava cones and caves that look like the surface of the moon as seen through a telescope. And the Big Lost River runs beside the town, only to vanish into the desert beyond. Recently, since the National Reactor Testing Station was established out in the same desert, there have been many unusual happenings-such as the development of the first atomic-powered engine for the submarine Nautilus.

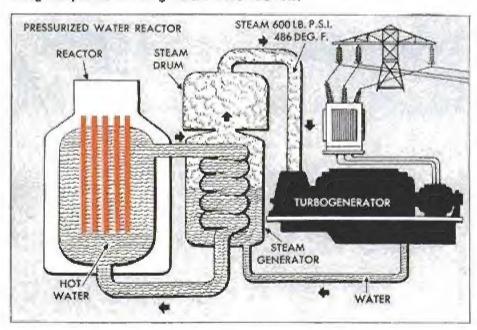
Then came the big Atoms for Peace Conference in Geneva, Switzerland, and the

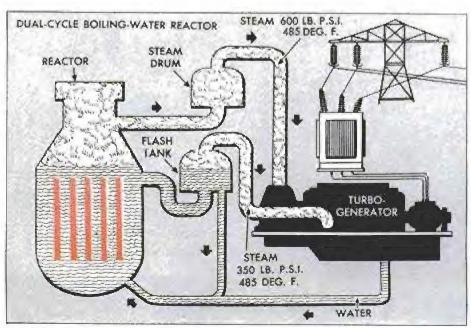
experiment in the quiet little Idaho town made headlines around the world. Among the scientists at Geneva, the Arco story dominated conversations in numerous languages. For this was the big step from laboratory experiment to practical application. The scientists had long known that electricity could be produced with atomic energy, but this was the first time their theories had been put to the test of practical use.

As the Arco story unfolded in their morning papers, citizens throughout the world suddenly woke up to the fact that in reality the Atomic Era had started. Atomic power had already driven a submarine and now it was producing electricity for heat and power. The next question was "What comes after Arco?"

One official of the Atomic Energy

Simplified diagrams show operation of two types of boiling-water reactors. A third variation of this group powers submarine Nautilus





Commission estimates that 10 percent of all U.S. power will come from the atom in 1975 and that the percentage will increase rapidly from then on. England expects that half of its power will be produced by the heat of fission in 1975. Civilization is going to depend more and more on A-power. The world's coal pile and its petroleum reserves are being used up rapidly, while more deposits of fissionable materials are being discovered all the time. On a B.T.U. basis, the known reserves of uranium are 22 times as great as the known reserves of coal, gas and oil.

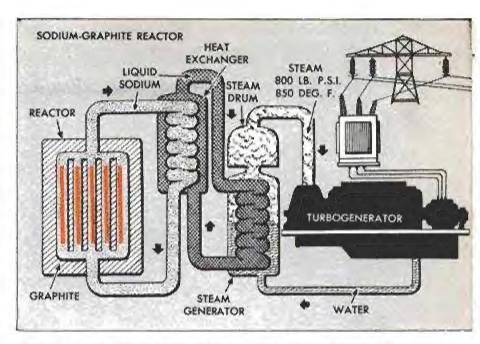
A pound of uranium, smaller than a golf ball, has energy equal to 1500 tons of coal. The trouble is that only a percentage of this power can be turned into electricity. The best experimental power reactors in use today are no more than 20 to 22 percent efficient. On that basis, a pound of uranium is equal to 300 tons of coal. Because of this, and also because of the expense of protecting personnel and processing wastes, electrical power from the atom costs considerably more than power from the "fossil" fuels.

To learn more-efficient ways of getting power out of the atom, and to bring the cost down to more practical levels, the AEC has begun a five-year research program, with private industry cooperating to a large extent. Various kinds of power reactors are being designed and built for comparative studies, to improve prototype designs and to gain further technical information for scientific use.

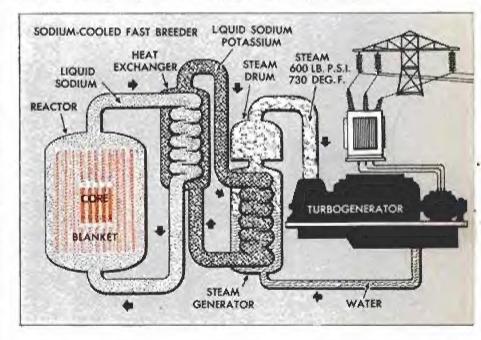
It should be remembered that an atomic reactor does not create electricity directly. What it produces is heat. In a power plant which uses atomic energy, a turbogenerator manufactures the electricity, just as it does in a plant using coal or oil. But in the atomic plant, a reactor developing heat through fission replaces the furnace which produces heat when coal or oil is burned in it. In both cases, the heat is used to boil water or some other liquid, converting it to steam. And the steam then operates the turbogenerator to produce the electricity.

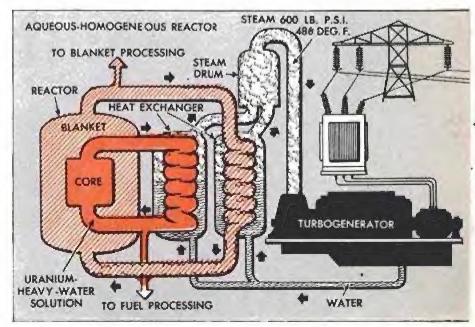
(Continued to page 234)

Aqueous homogeneous reactor eliminates need for expensive solid-fuel elements, and also acts as breeder of fissionable U-233



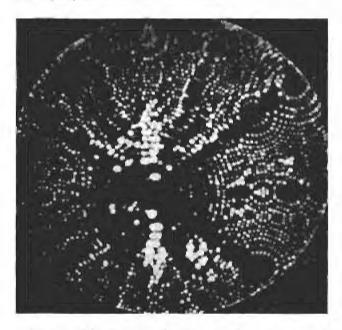
Above, diagram of sodium-graphite reactor, of type which will drive submarine Sea Wolf. Below, breeder creates new fuel





KEEPING

OR THE FIRST TIME in history, single atoms have been photographed on the surface of a solid. Here you see the result. Each dot is a single atom measuring 4,000 of 1,000,000 inch in diameter!



Even this figure does not give any real conception of the size of the minute particles with which the atomic physicist works. Each dot on the photograph is an atom, but within each atom, and about 20,000 times smaller than the total dot, is a nucleus. Revolving around it are much, much smaller electrons.

The photograph is the achievement of Dr. Erwin W. Muller, professor of physics at Pennsylvania State University. He used a field ion-emission microscope which he invented and which is capable of magnification up to 5,000,000 times.

Doctor Muller's surprising achievement, performed for Air Research and Development Command, will permit the study of films on the surface of metals, and may throw light on the migration of atoms, corrosion, friction, wear and lubrication.

Physicists who explore this unbelievably small world of the atom are always searching for better tools. The higher the energy of an atom smasher, the more useful it is. Energies of these big smashers are measured in billions of electron volts (BEV). Here are the ratings of the new or proposed smashers:

- 3 BEV—to be built at Princeton.
 6 BEV—this instrument, which accelerates electrons instead of protons, will

be built by Harvard University and Massachusetts Institute of Technology.

 10 BEV—scheduled to go into operation in Russia this year.

 25 to 30 BEV—the proton synchrotron now under construction at Brookhaven.

 100 BEV—a proposed new design by Dr. Lee C. Teng of Argonne National Laboratory.

 1000 BEV or more—under study by Midwestern Universities Research Association. The principle of this instrument is to use two atom smashers which will fire atomic bullets head-on into each other!

Why build such big machines? Scientists will use them to study particles already known as well as to create new particles. For example, antimatter, a particle difficult to conceive because it apparently is just the opposite of matter, was discovered with a six BEV machine last fall. Cosmic rays may yield their mysteries if man is able to achieve similar energies.

And ultimately such research usually leads to very practical applications. For example, a baby brother of the huge atom smashers went into operation at Stanford University a few weeks ago. The 6,000,000volt machine converts a beam of electrons into X rays which are expected to destroy cancerous growths deep within the body with minimal-compared to conventional X-ray—damage to outer layers of skin. The operator sits at a control board and observes the patient through a three-inch window. Inside the room, the patient sits in a power-driven chair or lies on a table and is held motionless with clamps. As much as 80 percent of the X-ray beam's output penetrates to the deepest part of the body. The cancer gun already is in use treating selected cancer patients.





The two-wheeled trailer has no axle, is supported in riding position by a sturdy fork in front of each wheel

Hydraulic Trailer Lowers to Ground for Loading

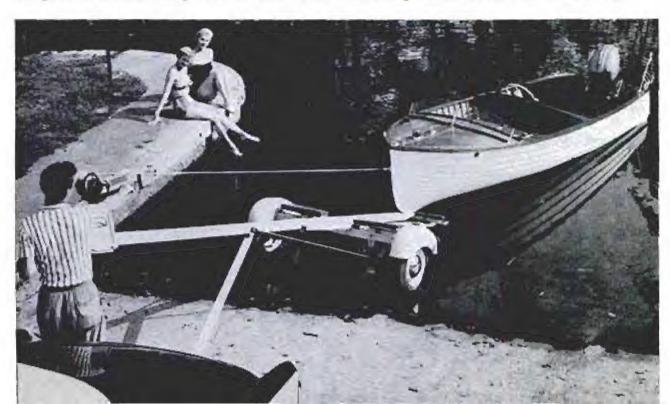
You can roll garden tractors and other heavy equipment right onto a two-wheel trailer that lowers to the ground for loading. A hand-operated pump just behind the trailer hitch causes two hydraulic cylinders to raise or lower the box. There is no axle on the trailer. Each wheel is mounted on a fork like the front fork of a bicycle. When hydraulic pressure is released, the forks tilt toward the ground and lower the trailer body. The eight by four-foot box has a road clearance of 10 inches.

Releasing hydraulic pressure causes trailer box to lower to ground. Box is raised with hand-operated pump behind hitch



Tilt-and-Turn Attachment Helps Load Boat on Trailer

Loading a boat aboard a trailer directly from the water without detaching the trailer from the car can be pretty tricky, since the keel of the boat has to be lined up with the trailer tongue constantly. But the problem can be simplified with a device which lets the trailer tilt backward and move from side to side at will. With it, the trailer can easily be kept in line with the boat's keel. After the boat is trailered, the tilt-and-turn device locks in a horizontal position with its own coupler.





Passengers ascend stairway to seats on upper level, where they have a good view of scenery on Santa Fe route

Hi-Level Train



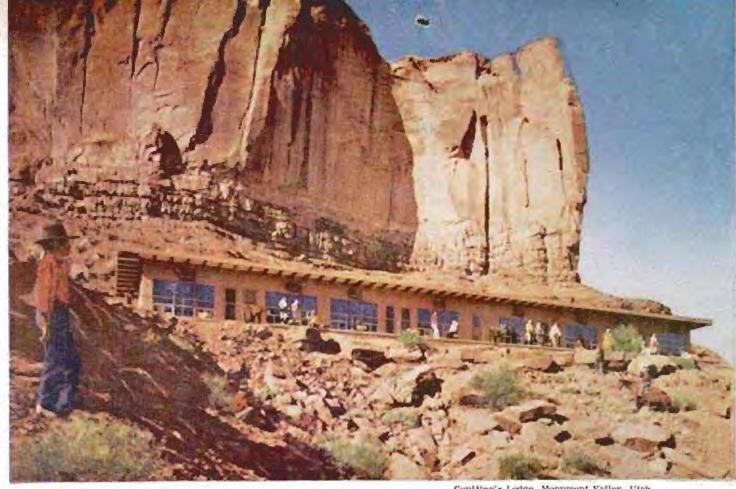
Passengers are now riding high aboard the Santa Fe's new El Capitan. The train is made up of cars 151/2 feet high, two feet higher than conventional cars. Each car has two levels, with the passengers seated in the upper level. They ride four feet higher than they do in regular chair cars. In the lower level are vestibules, rest rooms and luggage storage space. With the vestibules eliminated, the new cars have 28 more seats than older cars. Passengers enter through doorways at the center of each car and ascend a central stairway to the seating level. In the diner, the upper level is devoted entirely to table space. An electric kitchen occupies the lower deck, and food is transported to the upper level on two elevators.

Entry door is located in the center of each car, Lower level is used for baggage storage and rest rooms

Window Grille Keeps Locked Car Cool While Parked

Ventilating a locked car that is parked in the hot summer sun is a problem that most motorists face. It is solved by a sturdy metal grille that fits into the car window without hooks or screws. It takes only a second or two to install. The grille is also useful while driving. With it in position, the window can be lowered without being concerned about pets or children falling out. Sizes are available to fit different cars.





Typical of modern luxury motels, this lodge at Monument Valley, Utah, clings to a roadside canyon cliff

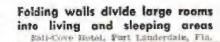
Sixty-six million touring Americans will sleep this year in the 60,000-odd motels along our highways and oceansides. The ramshackle clapboard farmyard cabins of yesterday are now

DRIVE-IN DREAM CASTLES

By Richard F. Dempewolff

MOTELS ARE ON THE MARCH. They're trekking downtown on stilts. At some of them, this summer, you'll drive into a street-level dock beneath your lavish room on the floor above. Other many-storied urban hotelmotels will provide free subterranean parking and hoist you to bed on elevators. On the highways, new multimillion-dollar drive-ins are sprawling out to provide fabulous luxuries for the 66,000,000 sleepy Americans who, according to the American Automobile Association, will be touring the country this year in some 23,000,000 cars.

The gleaming hostelries will offer vacationers and overnighters everything from water skiing and deep-sea fishing





JULY 1956



One giant tourist castle in Miami Beach, Fla., combines a hotel, a motel, apartments and villas, has 630 rooms

to games of giant checkers on huge outdoor checkerboards set in velvet lawns. Nearly all the new places feature not only full-size floodlit swimming pools, but satellite wading pools for the kiddies as well, not to mention playhouses and playgrounds. Inside, the weary traveler will find deluxe suites with built-in kitchens and folding walls to separate living and sleeping areas, and carpeted in "ankle-deep" wall-to-wall broadloom. Free TV, handy ice-cube ma-

chines, air conditioning and soundproofing are as standard as doorknobs, and some imaginative innkeepers have even installed "gyrating" mattresses that will rock you to sleep for an extra quarter.

Drive-in casties of 1956 come in startling forms, perched in startling places. Some cling to parapets of roadside cliffs overlooking spectacular views. On the Florida and California coasts, where they swarm the beaches and resort spots, neonlit en-

Pool at Galveston, Tex., motel is spanned by arched bridge for diving Jack Ter Hotel, Gatewine, Tex.









Motel deVille, New Orleans, La.
This 150-room motel is in the heart of the New Orleans business district

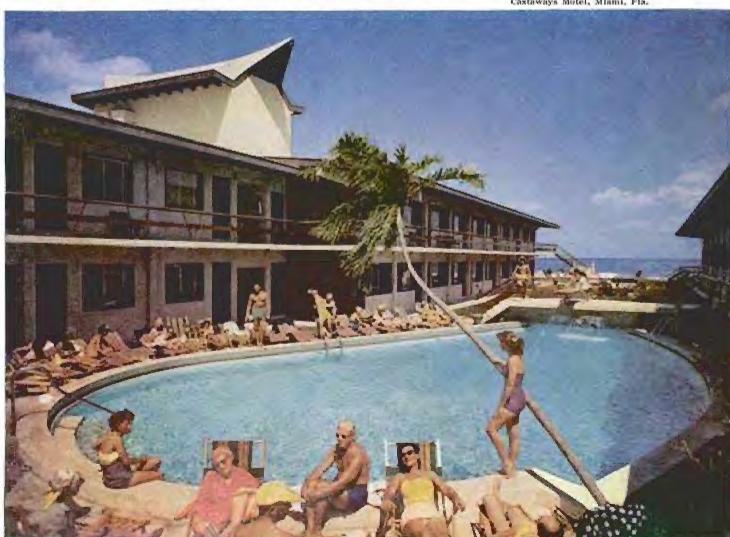
trance towers, Venetian bridges and spiral ramps vie for tourist attention. Behind them, 200 to 400-unit hostelries sprawl in a gaudy array of shapes and sizes, from individual plaster and stucco wigwams to fourstory seaside palaces, with South Sea Island roof structures for atmosphere. More than one Florida beach motel has stretched its "fingers" into the sea to provide free pier parking for customers who arrive in yachts. Motorcar-parking docks for land-roving customers are on the shore side. If you happen to be touring in a heli-

copter or airplane, several mammoth western motels can accommodate you (with free parking) on their new private heliports and landing strips.

It all began back in 1860, when an enterprising pioneer named Jack Morrow built some log huts alongside the Santa Fe Trail where, for a few pennies, drivers and families in lumbering covered wagons could taste the luxury of a straw bed after weeks on the road. Morrow did so well he added more cabins, plus a roadside tavern where he sold supplies and meals.

Another of Miami's luxury motels features Papuan architecture, free fishing and sail-it-yourself cruisers

Castawaya Motel, Miami, Fla.





This looks like a small city, but it's a motel at Marathon, Fla. Raised swimming pool is in foreground

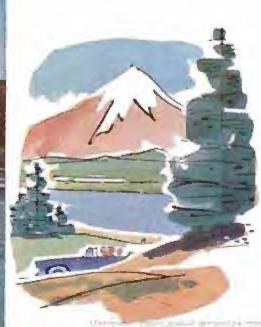
Oddly, no imitators showed up to cash in on the idea for 65 years. Then, in 1925, Arthur Heineman, a Los Angeles architect, drew plans for a chain of drive-in hotels along the coast of California to catch the growing auto-tourist trade. Only one was built - at San Luis Obispo. Though the establishment never made history, its name did. It was called Milestone Mo-tel, contracted from "motor hotel"-a word destined to become part of the language. For the next 15 years, thousands of farmers and country residents with highway frontage threw up clapboard cabins, offering the traveler four walls, rickety bedstead, mattress, trickling cold water, homemade lamp table and used chair (bring your own sheets and blankets) and called it a motel. Then, with the end of World War II and gas rationing. America took to the roads and motels jumped into big business.

20,000 auto courts dotting the country in 1946 had zoomed to nearly 60,000 by last summer, and they were still mushrooming at a rate of about 4000 per year. Reason: Steady prosperity, increasing population and the fact that 86 percent of all Americans now travel by car—for business and pleasure. But the biggest reason, any motel man will tell you, is that today's motel offers phenomenal luxuries that put most hotels and many vacation resorts to shame.

The modern owner thinks nothing of plowing \$1,000,000 or \$2,000,000 into his elaborate establishment, which may cost him \$7000 to \$15,000 per unit. To add "tone," he may not even call his place a "motel." It will be the something-or-other highway hotel, motor hotel, motor court, tourist court, drive-inn or similar variations on the same theme. Whatever its name, besides all the comforts and more

No modern motel is complete without its swimming pool and sunning area Fresno Hartenda, Fresno, Callut.







of a modern in-town hotel, it is bound to have the informal conveniences of the old-time motel. "Today's motorist wants to roll in after a day of driving, park his car by himself near his room, unpack and eat dinner in a sports shirt," explains one successful motelkeeper. "He's not interested in the city-hotel problem of turning the car over to the doorman for parking in an expensive garage blocks away, and tipping his way in and out of the place all dressed up in business clothes."

For this reason, in-town motels have used architectural gymnastics to maintain the easy parking and easy living features

of their country cousins.

It is at the swank 150-room Motel deVille, right in New Orleans' business district, where the traveler parks his car free in bays on street level beneath his room. Luxurious walnut and mahogany-paneled rooms and suites are in two levels above this "garage," resting on massive reinforced concrete stilts. The weary tourist may reach his room by elevators or stairways, via outside "deck" corridors whose redwood rails are laced with yellow canvas to provide privacy and a restful "shiplike" atmosphere.

New Orleans isn't the only place with a city motel buried in the business district. One of the pioneers was Rochester, New York's multistory, 137-room Treadway Inn, with parking court and elevators, right in the heart of "automobile row." Half a dozen downtown motels have sprung up in San Francisco in the past two years. One, a 14-floor steel skeleton building with all-glass exterior like the UN Secretariat, is smack on Nob Hill. Chicago's brand new

motel, The Sands, recently opened on the North Side, right next door to the famous Edgewater Beach Hotel. It features restaurant, swimming pool and cocktail lounge.

Stiff competition has inspired many new luxury features in today's motels. "If the place across the road adds something new," explains W. H. Farmer, owner of a southern chain of Alamo Plaza courts, "you've got to go him one better or lose some customers." Recently, Farmer put in a 50-foot swimming pool at his 73-unit Dallas court "in self-defense." He also bought 65 TV sets outright to keep from "bothering his guests with that quarter coin box."

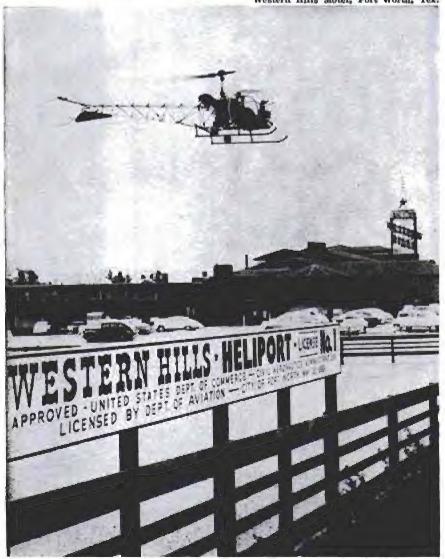
Result of this fight for the tourist dollar has been a pile-up of features and services some of which can make your head swim. Some, like Holiday Motor Hotel in Mechanicsburg, Pa., have built revolving stages and huge halls for business conventions. In La Jolla, Calif., Del Charro's management installed a ticker tape for roving Wall-Streeters. At the huge (267 units with 88 more being built) Fresno Hacienda in Fresno, Calif., travel-weary guests may languish in rooms or on sun decks beside any of three pools, while a self-propelled "barmobile" wheels around the motel's 20 acres distributing cool liquids to roadparched throats. More energetic folk may prefer hoofing it over to the Hacienda's lounge. Here, while sipping, they can watch through the world's biggest plate-glass viewing window while a pair of "mermaids" go through a graceful underwater routine in a big swimming tank set in the wall behind the service bar. The Hacienda also "throws in" a coffee shop, big dining room, floor show, and a barber shop.

JULY 1956 101



Unusual appearance of these tepee units at San Bernardino, Calif., helps to attract passing tourists

Motels keep ahead of the times as many add heliports and landing strips to attract air travelers. This heliport at Fort Worth, Tex., was the first Western Bills Motel, Fort Worth, Tex.



At small motels and big, operators cram attractions and services to lure the wanderer. At the Bali-Cove, a two-story tropical court in Fort Lauderdale, Fla., vines cover the curling wrought-iron stair and balcony rails, and a lush swimming pool reflects the U-shaped court. White-coated busboys hustle around before dawn delivering fresh, free orange juice and newspapers through tiny doors that open on closettype kitchenettes inside. Rooms have plastic accordion dividers that convert them to separate living and sleeping suites, or open to make big single rooms. Besides the usual swimming, refrigerated rooms and tile baths, the 77-room Desert Inn in Phoenix, Ariz., has built into every area of its lawns, concrete shuffle-board courts, and huge checker and chess platforms surrounded by garden furniture. While spectators lounge and watch, players move foothigh chessmen across the big pads. In Houston,



Sixty-foot pylon advertising motel in New Orleans is hollow, contains air conditioner for dining room

Tex., the 46-unit Grant Motel is one that has installed the "gyramatic" mattresses. These lullaby items are operated from the foot of the bed by a silent motor, tied into the pivot-hung mattress by oscillating rods. "The rocking goes clear through your bones," according to E. H. Grant, the motel's owner who has a list of "regulars"

with a standing order for rockaby beds. The bigger the motel, the more fabulous everything gets. Hank Green's Western Hills (original estimate \$400,000; actual cost \$2,000,000), on U. S. 80 near Fort Worth, Tex., was one of the first of the super-ultra-whoppers when its clustered (Continued to page 210)

Space utilization is keynote of modern motels. Here cars and swimming pool are on ground level, rooms above

Motel deville, New Orleans, La-



JULY 1956



Mechanic tightens nuts on ald auto wheel which is welded to cradle, fastening it to the brake drum



Long iron bor is slipped over pipe on cradle and mechanic grasps it high up to rock the cradle over

Cradle Tips Volkswagen For Easier Repairing

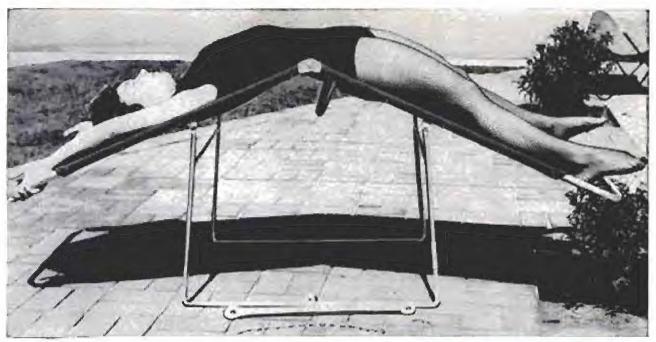
Two men can turn a small car over on its side in two minutes with a cradle invented by a Hamburg, Germany, mechanic. Designed originally for the Volkswagen, the cradle will soon speed the repair of all types of autos. The back and front wheels are taken off the car on one side and each replaced by a rim welded to a cradle. The rims are bolted to the brake drums like wheels, iron bars are slipped over sockets on the cradles and the automobile is pulled over with little effort.



Putting weight on ends of bars, men easily tip car on its side

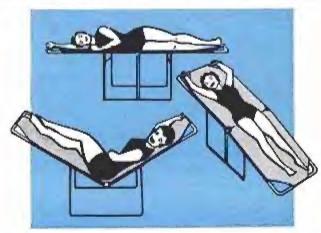
Plastic Dome for Stadium

Rain checks will be ancient history as far as the Brooklyn Dodger Baseball Club is concerned if present ideas for their new stadium are put into effect. The new stadium, in the idea-and-model stage, has been proposed by R. Buckminster Fuller, famed as the designer of the dome which covers the Ford Rotunda Building in Dearborn, Mich. A lightweight plastic dome, supported by aluminum trusses, would put a cover on the stadium that would tower 300 feet above the playing field at its highest point. The interior would be air conditioned.

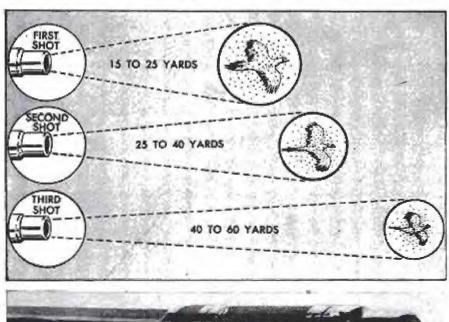


Exercising Chair

Body-toning exercises can be performed on a steel-and-canvas unit that adjusts to several different positions. It can also be used as a lounge chair or sun-bathing cot. The tubular-steel frame, which hinges at the middle for exercising back and abdominal muscles, is supported by legs of solid steel. A small chain locks the chair in any position from a broad V shape to a similar inverted V. When straight, it can be inclined in either direction in the manner of a teeter-totter.

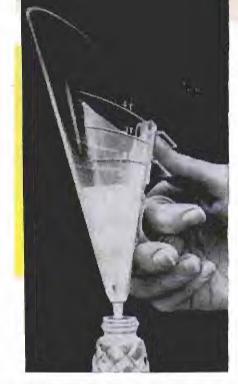


Shotgun Choke Changes Automatically to Produce Three Patterns



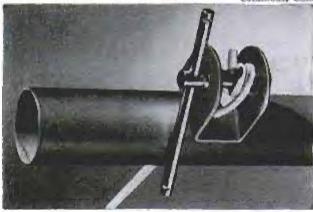
Hunters now have a shotgun choke that produces automatically the proper shot pattern at three different distances when the gun is fired three times. The hunter's first shot gives a 30-inch killing pattern at 15 to 25 yards. The choke instantly adjusts itself and the second shot produces a dense pattern at 25 to 40 yards. The third shot gives a full-choke setting at 40 to 60 yards. With this progressive action the hunter can fire three shots at the game with the proper pattern for each shot. The choke also can be locked in any of the three positions or adjusted manually between shots.

four Home





COMBINATION SCOOP and funnel makes it easy to scoop up powders and liquids, measure them and then funnel into bottles. After ingredients are in scoop, they are released by thumb-controlled knob on side
Chester II. Nicodemus and Co., 447 Clinton Heights Ave...
Columbus, Onio



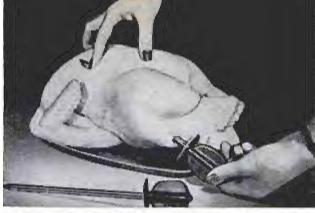
DROOPING CLOTHESLINES can be tightened quickly if they're equipped with a self-locking tightener. The tightener is for wire or plastic clotheslines only, can also be used to tighten fence and TV guy wires Denne Smith Sales, 3930 Urbandale Ave., Des Moines 10, Iowa

MODERN PLANTER that also serves as a room divider is made of maple. The wooden rack holds plastic bowls in brass holders that can be moved to various positions so that you can vary the wall's design Paymor, 225 Fifth Ave., New York City 10

COFFEE TABLE from which to serve guests during pleasant conversations converts to a bridge or dining table that is 27 inches high at a touch. Available with wooden or plastic top in mahogany, limed oak, maple and ebony Puglia Furniture Co., Elizabethtown, N. C.







MEATS CAN BE COOKED QUICKER and with less shrinkage by the insertion of hollow, heat-conducting pins. Oven heat converts liquid inside pin to steam Thormo Pin Curp. of America, Box 406.

Minedia, Long Island, N. Y.



ICE CRUSHER ATTACHMENT fits any model of the Waring Blendor, quickly turns ice cubes into sparkling crushed ice for frappes, desserts, salads and drinks Waring Products Corp., 25 West 43rd St., New York City 34



PERFORATED DISK made to fit into bottom of 10-inch skillet cooks "greaseless" bacon with less shrinkage. The disk, made of aluminum, spreads the heat evenly and cuts the cooking time 8.P.R. Company, 6325 Epworth Itted., Betrott. Mich.



ELECTROSTATIC BROOM, with the sweeping head made of sponge rubber, picks up dust by "magnetic" action. No dust settles elsewhere after sweeping. Sweepings are released from broom head by washing Wells Specialty Company. North Liberty. Itid.

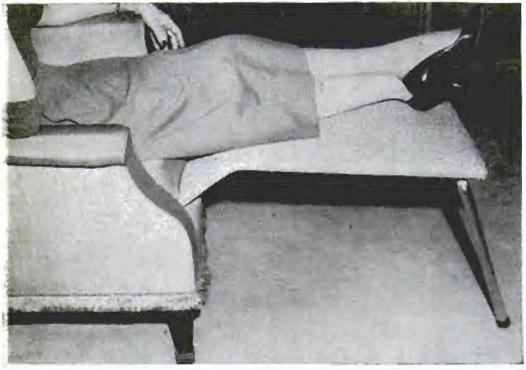
TWO-DRAWER FOOD WARMER that can be built into kitchen-cabinet bases will keep dinner hot for hours. Food will not get soggy, discolor or lose flavor, because each drawer has separate humidity control McGraw Electric Co., Elect. 111.





CLOTHES DRIER for the back yard lowers with a few turns of the crank so the clothes can be hung easily, then raised two feet for drying. It has 140 feet of line, spins freely in the wind to help drying. In between wash days, the honger can be converted to a large garden umbrella

Hagel's Hoist Inc., 821 South Street. Long Beach, Calif.



DETACHABLE LEG REST converts any chair to a contour chair to provide comfort for aching legs. Available in green or maroon, the unit folds flat for storage. Rest measures 151/2 by 28 inches

233 Fredinghuysen Ave. Newark 5. N. J.





FOLDING WRINGER, attached to a full-sized clothes washer, permits the top of the washer to be used as a table when the machine is not in use. A 20 by 25inch table-top cover comes with the washer, with a glass-fiber surface which won't chip or rust, The wringer has a lock to prevent it from folding while in use

Apex Home Appliance Div., Apex Electrical Mig. Co., Cleveland, Ohio



BAKING SODA sprayed from a can by means of a special nozzle and propellant is the latest in home fire extinguishers. Can provides a sixto-seven-second spray of powder which covers area 30 inches in diameter from distance of 10 feet Safe, Inc., 2800 Parketter Ave., Marinette, Wis.

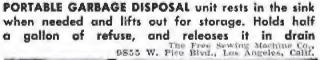


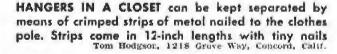


CUT A LATTICE DESIGN in pie crust in one motion with a heavy-duty plastic cutter. Simply lay the cutter on the rolled dough, press down and design is cut House of Schiller, 180 N. Wacker Dr., Chicago 6



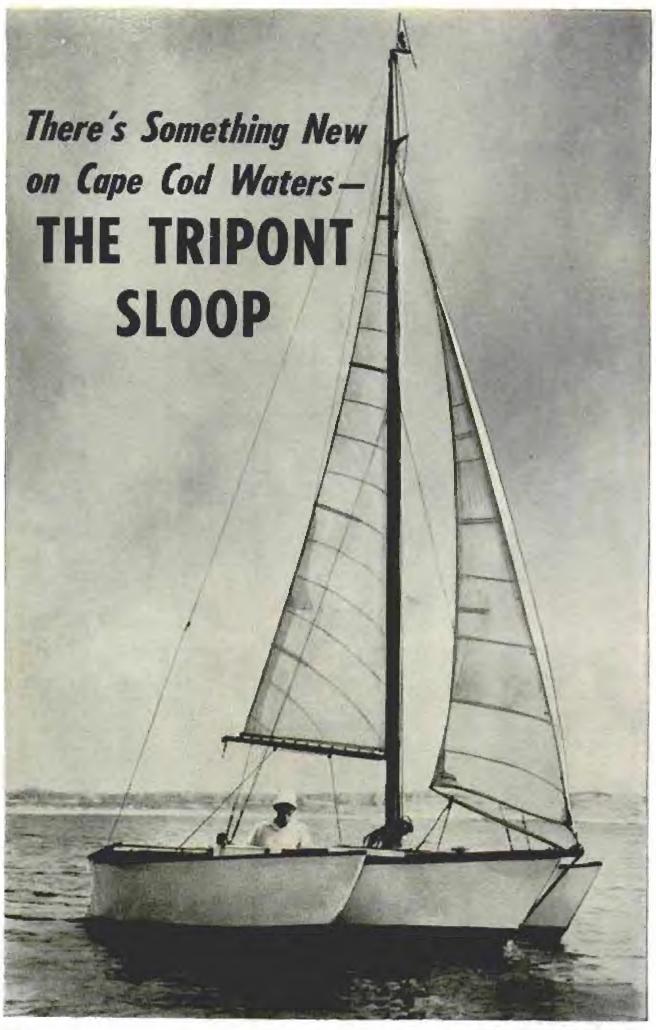
KITCHEN KNIFE with adjustable arm and serrated blade permits curver to cut slices of a roost or ham to any thickness he desires. Use for any slicing Job Ernest J. Eckers, P.O. Box 403, Nouth Gate, Calif.







JULY 1956



By Calvin D. Campbell

A MIGHTY STRANGE craft is sailing the waters off Cape Cod these days. Yankee sailors—men who really know the clean lines of a ship—are doffing their Nantucket caps to the tripont sloop.

The craft is the result of 15 years of study, design and work by Dr. Edwards Herman, a retired physician who lives in Lincoln, Mass. The tripont is the natural outgrowth of several catamarans—twin-hulled craft—which Doctor Herman built in the past and which touched off a great deal of talk by conventional yachtsmen.

The tripont, as the name implies, will co is a three-hulled craft with a large hull in the center and a smaller hull on each side. The stability thus is comparable to that of the time-tested outrigger.

According to Doctor Herman, a catamaran tends to nose dive in rather rough water and is subject to tremendous structural stresses. The doctor's studies and experience led him to the conviction that a three-hulled boat would eliminate these conditions, yet the craft still would retain most of the catamaran's superior speed.

To prove his theories, even to himself, Doctor Herman first built a scale model three feet long. After testing it, the 71-



Dr. Herman and his son head out to see in unique craft, which will carry six but is designed for overnight cruising by two

year-old physician went into production on the full-size tripont.

Paper Patterns

Shopping the lumberyards, he came across a supply of Paraná pine, a very hard Brazilian wood which he could pick up at a bargain. It proved ideal for the tripont. Before building the unique craft he traced out full-size patterns on carpenter's brown paper, then cut the parts to fit the pattern.

The center hull is 18 feet long and has a short bowsprit. The beam measures 2½ feet at the waterline and flares out to 4½

Tripont's designer fits the tiller to his three-hulled craft. Oak cross members tie the hulls tagether



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Before starting the full-size tripont, Dr. Herman built a scale model to test seaworthiness of design

feet at the deck. Across the hull and fastened solidly to it are four oak cross members. These connect the three hulls. The two outer hulls are each 11 feet long.

Drawing 17 inches of water, the tripont can carry six persons although it is designed for cruising for only two. The cruising facilities are excellent, and were designed by Doctor Herman and his wife.

Two folding bunks stretch across the cockpit. A canvas tent can be rigged over these bunks and across the three hulls during overnight cruises. When not in use, the bunks can be partly folded back to pro-

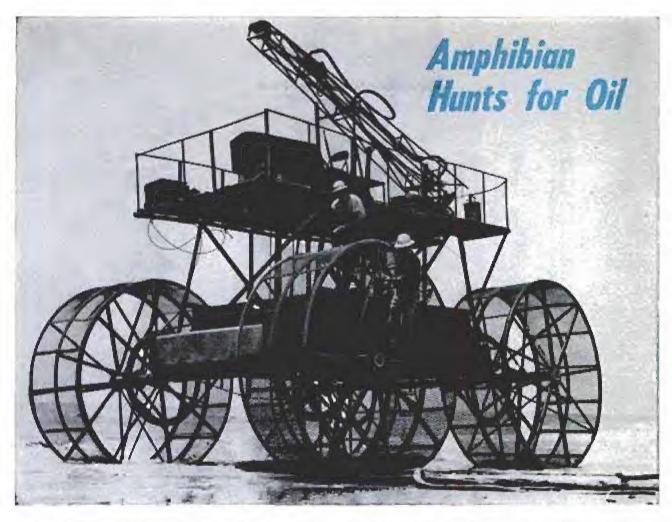
vide a foot-wide shelf.

The bedding (and bunks, too, when they are not to be used for some time) is stowed in the two smaller hulls. In the remaining space of the three hulls are stored a twoburner stove, several cooking utensils, an ample supply of food, a 5½-horsepower outboard motor with fuel for it, and any personal belongings that the crew wants to take along on the cruise.

According to the builder, the tripont steers more steadily, is more maneuverable and comes about better than the catamarans he has built in the past. Somewhat slower, it still makes good speed and is amazingly seaworthy in heavy seas. * * *

Boatbuilder checks the 26-foot pine mast in his basement workshop. The mast carries 120 feet of mainsail and a 70-sq.-foot jib. Dr. Herman built the tripont sloop with only two power tools, a saw and a drill press



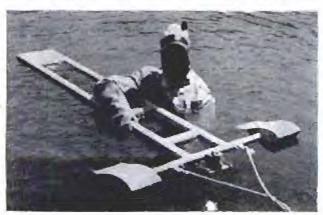


Offshore oil exploration is being aided by an amphibious vehicle capable of wading in water 18 feet deep. Built in Louisiana, it is used for seismographic exploration in water too deep for land vehicles and too shallow or too rough for boats. Tanks at the axle level are emptied or filled with water to provide flotation or ballast.

Sled Towed Behind Boat Takes

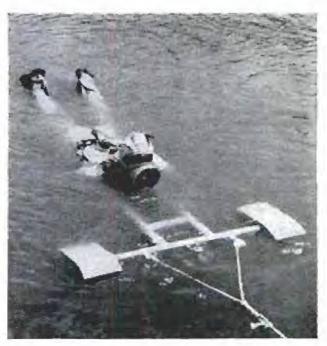
Skin divers can explore the depths on a submarine sled that can be controlled with one hand. The sled, towed behind a boat, can be made to dive, surface, turn and roll. It will submerge when towed at speeds as low as 3 miles per hour and as high as 15 miles per hour. If the diver leaves the sled

Diver lies on the submarine sled and operates controls with his hands to dive, surface, turn or roll. When diver leaves the sled it automatically comes to the surface. Gear can be lashed to the sled

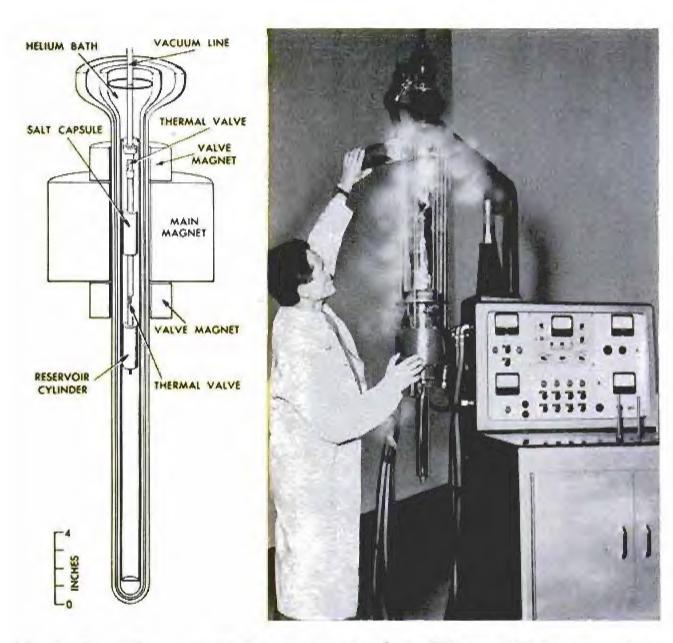


Diver on Undersea Tour

it will rise to the surface. Equipment can be lashed to the sled for underwater use by the diver.



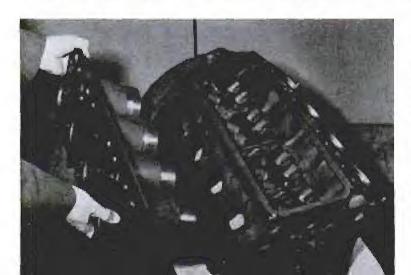
JULY 1956



Motionless Magnetic Refrigerator Cools to Minus 459 Degrees F.

There are no moving parts or fluids in a laboratory refrigerator that cools a small cylinder to minus 459 degrees Fahrenheit (almost absolute zero). Key part of the refrigerator is a capsule filled with a chemical salt that loses its heat when magnetized. Heat flows through metal rods, in stages, from reservoir cylinder to chemical salt to a helium bath. Each time the salt is magnetized it loses its heat to the helium bath.

When it is demagnetized, it draws heat from the reservoir cylinder. Thermal valves—thin strips of metal joining breaks in the rod—keep the heat flowing the right way. They conduct heat when magnetized, stop heat when demagnetized. Scientists plan to use the refrigerator in studying subtle changes in atoms and molecules. At extremely low temperatures the particles become quiet and are more easily observed.



Engine Costs Less to Make

In a new, less-expensive method of making automobile engines, the engine cylinders and top deck are not cast with the block, but are a separate assembly. Expensive baked-sand coring is eliminated or drastically reduced. Better material can be used in cylinders, softer iron in the block. A more durable engine results.

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Ever hear of cows heat-

ing a house? Tage Espersen of Nannerup, Denmark, decided it was costing too much to heat his home, so he put his cows to work as a heat source. The heating system works on the same principle as a refrigerator. Normally the temperature of Espersen's stable, because of insulation, rises too high, and the stable must be ventilated. The heating system draws the warm air through screened openings into a heater unit, where a water filter washes away any impurities and odors. The hot, purified air then strikes a cooling coil which lowers the air temperature about

nine degrees. This cool, fresh air then is circulated

back into the stable.

Meanwhile the heat which has been absorbed by the cooling coil is regained in a condenser and passed on to a hot-water tank. The hot water then is circulated through radiators in the farmhouse. Thermostats permit the temperature of the dwelling to be kept at a steady 70 degrees.

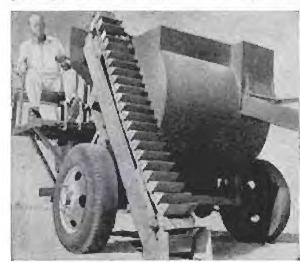
Fourteen cows provide enough heat and hot water for the house. The cost of the electricity for the system is less than half the cost of heating the house with either coal or oil.

Self-Propelled Concrete Mixer Picks Up Sand and Cement

Capable of carrying two cubic yards, a self-propelled concrete mixer picks up its own sand and cement and mixes it between sand pile and delivery point. The new machine, called the Solo-Mix, lifts four tons of sand and cement with its elevator, empties it into a large mobile mixer and then turns in its own radius to pour finished concrete into nearby footings, foundations or slabs. It can load, mix and discharge in a 10-minute cycle and is intended for onthe-job use, rather than as an over-the-road hauler. All operations are controlled by one man from the driver's seat.

Operated by one man, the self-propelled mixer picks up sand and cement, mixes it as it proceeds

Machine lifts four tons of sand and cement into its mixer, completes load-mix-discharge cycle in 10 minutes





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What Is the Best-Liked Feature?

Power, performance say 58.3% of the owners

"It has a snappy, dependable engine that will take a lot of top-speed driving."

"I like that fast acceleration on takeoff. Most of all I like the power when passing, especially on hills."

VIRGINIA CARPENTER

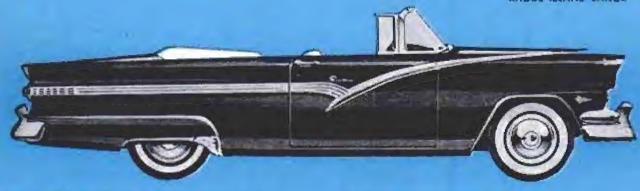
What Is the Most-Frequent Complaint?

Body rattles, squeaks say 16.2% of the owners

"Doors rettle and leak. Rear end whines. Mechanics don't seem to know what's wrong." ALABAMA CRANE OPERATOR

"Very, very noisy in body as well as engine and seats."

RHODE ISLAND SAILOR



HOW MANY HAVE SEAT BELTS?

SAFETY QUOTATIONS

| No belts Belts front seat only | 84.3% 15.7% | "Best thing Ford ever did." UTAH BACTERIOLOGIST |
|-----------------------------------|----------------|---|
| Belts front and rear seats | 0.0% | "A must for me from now on." GEORGIA SALESMAN |
| and them one real sector | 0.070 | |
| ARE SEAT BELTS USED? | | "Should be standard if really safer." MICHIGAN PRIEST |
| Wear them all the time | 21.9% | "Ripped clothing on belts twice so I took them out." |
| most of the time | 34.4% | SOUTH CAROLINA GOVERNMENT WORKER |
| some of the time | 25.0% | "Safety emphasis is idiotic as long as that hood ornament |
| none of the time | 18.7% | sticks out in front." OHIO ADVERTISING MAN |



Ford V8 Has Plenty of Power, Say the Owners; Only 3.4 Percent Wear Seat Belts All the Time

FORD, more than any other auto maker, has been selling "safety." What has the public response been? Our Owners Report on the 1956 Ford provides an answer.

The public, apparently, is not taking to seat belts. Despite the fact that safety groups, scientific and otherwise, stress the value of belts, the public does not seem anxious to buy them and, once having bought them, is not anxious to use them.

Only 15.7 percent of the Ford owners in (Continued to page 119)

CLYMER TESTS THE FORD

By Floyd Clymer

MY TEST of the 1956 Ford Crown Victoria Skyliner was the longest and most grueling PM test I have ever made. Total mileage was 3098 miles from Los Angeles to Colorado Springs, Colo., and return. It ranged from Death Valley, Calif., (203 feet below sea level) to the snow-covered Monarch Pass in Colorado (11,312 feet above sea level). I put the Ford through every tough test I could think of. Even with wide-open throttle on long mountain grades or in desert heat there was no evidence of overheating or underpower.

Gasoline economy was reasonable at moderate speeds, but not too good at high speeds. I'm not easy on a throttle. A more conservative driver would get better mileage than I do. Two quarts of oil were

added in the first 2500 miles.

The speedometer needle at times indicated 116 miles per hour, but a speedometer check showed an actual top speed of approximately 7 percent less.

Although the front springing is quite soft and (Continued to page 220)

Clymer's road test of the 1956 Ford V8 went from the extremes of snow-packed Monarch Pass down to sun-parched Death Valley

CONTINENDAL ONION
MONARCH PASS
(LLS 307*)

AT SEA LEVEL





An Engineer Analyzes the Ford With 225-Hp. V8

By Dale Kelly, SAE

MODEL TESTED: Fairlane four-door sedan with Fordomatic transmission, power seats and steering, and 312-cubic-inch, 225-horse-power V8 engine. Compression ratio: 9.0 to 1. This engine is an extra-cost option available only on Fairlane and station wagon models. Weight: 3750 pounds with gas tank half full (59 percent on front wheels, 41 percent on rear). Rear-axle ratio: 3.22 to 1. Tires 7.10x15. Wheelbase (measured): 115½ inches left, 115½ inches right. Barometer 29.74 inches, temperature 67 degrees F., payload 400 pounds for acceleration and top-speed tests, 200 pounds for fuel economy. for fuel economy.

80.0 74.0

70.0

65.0

ACCELERATION



| TIME IN SECONDS | 0-20 | 0-40 | 0-60 | 0-80 | 14 mile |
|--|------|------|------|------|---------|
| Ignition timed for regular gasoline Ignition timed for premium | 4.0 | 7.4 | 14.0 | 25.0 | 20.35 |
| gasoline | 3.6 | 7.1 | 13.4 | 23.4 | 19.9 |

(The watch was started the instant accelerator was floored. The engine was not run up against the brakes before the start. All tests were in Drive range, but the accelerator pedal was pushed past the detent, so that low, intermediate and high gears were used.)

FUEL ECONOMY



| MILES PER GALLON | Steady 30 m.p.h. | Steady 50 m.p.h. | Steady 70 m.p.h. | Traffic Route |
|-------------------------------------|---------------------|---------------------|---------------------|------------------|
| Ignition timed for regular gasoline | 20.4 | 17.6 | 13.9 | 10.7 |
| Ignition timed for premium gasoline | 20.7 | 18.1 | 14.5 | 10.9 |

ESTIMATED ANNUAL GASOLINE BILL: \$176 for 10,000 miles. Based on 2000 miles at 30 m.p.h., 5000 miles at 50 m.p.h., 1500 miles at 70 m.p.h. and 1500 miles in traffic. and on the assumption that 25 percent of users will be able to get satisfactory performance on regular (27 cents a gallon), the rest requiring premium (29 cents a gallon).

SPEEDOMETER ERROR



MILES PER HOUR

Indicated speed True speed 19.0 28.5

ODOMETER ERROR

The odometer indicated the correct mileage within one percent.

DRIVER'S VISION



Some portion of the road could be seen 15 feet in front of the car (A in sketch) by an average driver (5 feet 9 inches tall); full width of the road could be seen 22 feet in front of the car (B in sketch).

38.0

47 0

56.0



The bottom corner of the rear overhang would touch the ground if the car were driven through a dip whose profile had a radius of curvature of less than 22 feet. The center of the car would drag if the car were driven over a hump with a radius of less than 15.5 feet.

The differential would drag if the car were driven in ruts deeper than 8 inches. The doors would open over a 13-inch curb.

MISCELLANEOUS

MISCELLANEOUS

OCTANE REQUIREMENT: The basic ignition timing had to be set to two degrees after top dead center for knockfree operation on an 85-percent octane blend of octane and heptane, equivalent to typical regular gasoline (88 octane Research). Acceleration and gasoline mileage listed above for regular gasoline were obtained at this setting.

The best acceleration from standstill to 45 miles per hour was obtained with the ignition advanced to three degrees before top dead center. The acceleration and gasoline mileage listed above for premium gasoline were obtained at this setting.

With any further advance, the engine knocked on a 90-percent octane blend of octane and heptane, equivalent to typical premium gasoline (95 octane Research). Note that in this car, with a 700-mile carbon accumulation, there was a noticeable loss in acceleration when the car was tuned for regular gasoline. Another car of the same model could, however, have an octane requirement several points higher or lower.

STEERING: From straight ahead, the steering wheel had to be turned 0.85 revolution to make the outside of the outer front wheel travel in a circle with a radius of 50 feet. The steering wheel turned 4.5 turns from lock to lock. The diameter of the turning circle, to the outside of the outer front tire, was 41.5 feet. that of the walled circle in which the car could turn was 44.25 feet. Steering-wheel diameter; 18 inches.

TRUNK CAPACITY: In addition to spare tire and tools, the trunk could accommodate 12 cardboard cartons of the size used for 48 tall cans of evaporated milk.

milk.

INTERIOR SOUND LEVEL: Inside the car the noise level with all windows closed was 92 decibels at 40 m.p.h.. 95 decibels at 60 m.p.h. on a smooth road.

CENTER OF GRAVITY: The center of gravity of the unloaded car was 24.5 inches above the ground.

GASOLINE FILL RATE: The gasoline tank could be filled at the rate of better than 14 gallons per minute when almost empty. No filling-station pump used during the test was capable of pumping faster than the inlet pipe could take it.

BEAKES: Partly because the rear wheek carried

BRAKES: Partly because the rear wheels carried only 41 percent of the total weight, the rear wheels locked first on a severe application, causing the rear of the car to swerve sideways. Otherwise the brakes worked well. The parking brake held the car on a 14-percent grade.

VENTILATION: The air inlets were low at the front of the car, where they would be likely, in heavy traffic, to take in exhaust gas from the car ahead.

WATER RESISTANCE: Car was washed in an automatic high-pressure car wash and driven through a standard splash pan. In the wash test, a few ounces of water get past the door seals: none got into the trunk in the splash test no water entered the car. In neither test were the brakes or ignition affected.



Owners from 47 states (color) took part in the Ford survey. The one state not included is Pennsylvania

The Owners Analyze The 1956 Ford V8

OVER-ALL RATING

Excellent 68.0%

Average 29.5%

Poor 2.5%

And the second of the second o

| Had trouble with engine? |
|--------------------------------------|
| No trouble |
| What was engine trouble? |
| Carburetor |
| Would like more top speed? |
| Yes |
| Would like faster acceleration? |
| Yes |
| Did styling influence choice of car? |
| Yes, it did |
| Best-liked styling feature? |
| Chrome side trim |
| Loast-liked styling feature? |
| Chrome side trim 8% |

Exhausts in bumper..... 4%

| Best-liked interior feature? Dashboard design |
|--|
| Least-liked interior feature? Floor covering |
| What make car was traded? Ford |
| Would buy Ford next time? Yes, would |
| How is dealer service? Excellent |
| Would buy from him again? Yes, would |
| Rest-Liked Features |

Power, performance . .

Handling ease

Exterior styling .

Riding comfort.... Safety features....

| Economy of operation |
|--|
| Most-Frequent Complaints |
| No complaints at all |
| Why Did They Buy Ford? |
| Exterior styling 20.6% Previous ownership 15.7% Best deat on old car 9.3% Performance 8.8% VB engine 7.8% Safety features 5.4% |
| What About Safety? |
| Have padded dash, visors48.0% Have seat belts, front only15.7% Have belts, front and rear0.0% |
| How often are belts worn? |
| (asked only of those with belts) |

Wern all the time......21.9%
Wern most of time......34.4%

Worn none of time...... 18.7%

Worn some of time.....

34.4%

the survey have seat belts in the front seat. None has them in both front and rear seats. Of those whose Fords have belts, only 21.9 percent say they wear them all the time (this is only 3.4 percent of all the Ford owners in the survey). Another 34.4 percent wear them most of the time; 25.0 percent wear them some of the time and a surprising 18.7 percent never wear them although the car is equipped with them.

Padded dashboard and sun visors are more popular with owners-48.0 percent having them in their 1956 Fords. Many more owners are enthusiastic about the "deep-dish" steering wheel which is standard equipment on all 1956 Fords.

Here are some typical quotations of Ford

owners on the subject of safety:

"Was involved in a bad accident last August and believe if I had my present Ford I would not have been hurt as badly and maybe not at all."—Iowa farmer.

"I wear the belts all the time. I had an accident and know how they help,"-Michigan businessman.

"Belts make driving more comfortable. They help on rough roads and when cornering."-Nevada communications man.

"I like the safety wheel and padded dash. Would never use belts."-Vermont clerk,

"Would never buy another car without belts and safety equipment,"-Air Force pilot.

'I wear the belts only when I drive at high speed."-New Mexico oil worker.

My wife loves the safety features, especially for our youngsters,"—Iowa salesman.

"I do not have belts because of fear of

ridicule."-Michigan priest,

"I have seat belts but don't ever wear them. I just don't want to be pinned in if wrecked."—Oklahoma bus driver.

"Safety stress is fine, but it's idiotic as long as that hood ornament sticks out in

front."—Ohio advertising man.

"They should find something to take the place of belts. People think they are too much trouble."-Nevada electrician.

"Present measures are 'red herrings'. Reducing top speed to reasonable figure



Best-liked feature of the 1956 Ford V8 is its power and performance, of which this picture is evidence

would be real safety contribution."-Wyoming chemist.

What Do They Like Best?

These safety features placed fifth on the list of best-liked features of Ford owners with 10.3 percent mentioning them. First on the list is power and performance, with

Frequent complaint of owners is that the wrap-around windshield makes getting in and out more difficult



58.3 percent concurring. Second comes handling ease, with 42.6 percent; third is exterior styling with 30.9 percent, and fourth is riding comfort with 18.6 percent.

The following quotations describe the best-liked features:

"I like the smooth and fast take-off in any gear as I gradually mash the accelerator."—Indiana factory worker.

"Good performance at normal driving speeds."—Iowa farmer.

"I drove to California. It goes too fast. Did 115 m.p.h. in Texas without trying very hard."—Oklahoma salesman.

"Smoothest running, easiest handling car I ever owned. Plenty of power at any speed."—Colorado carpenter.

"Handles very well in traffic."—California mechanic.

"Best looking car on the road today."— New Mexico service-station owner.

"My black-and-white Victoria is the most beautiful car on the road."—Wyoming hospital worker.

"It rides like a larger and heavier car." —Montana housewife.

"I like the safety features. I can drive with more confidence. The belts increase my comfort. I don't slide on the seat."— Florida traveling salesman.

What Don't They Like?

Although nearly a third of the Ford V8 owners make no complaints at all (32.4 percent), there are others who are not so satisfied. The most-frequent complaint is body rattles and squeaks (16.2 percent). Second on the list is poor gasoline economy

(14.2 percent); third is careless body assembly (10.8 percent); fourth is the fact that the wraparound windshield makes it awkward to get into the front seat (8.8 percent), and fifth is engine noise (7.4 percent).

The following describe these and other complaints in order of fre-

quency of mention:

"Doors rattle and leak. Rear end whines. Mechanics don't seem to know what's wrong." — Virginia

carpenter.

"Should get better mileage. Mileage was cut considerably by snow tires this winter. Got only 8 to 12 miles per gallon. Now getting 13 to 16."—Illinois farm advisor.

"Although Fordomatic takes much work out of driving, I believe the extreme sacrifice in gas mileage is too much. I get from 13 to 15 miles per gallon."—Rhode

Island sailor.

"Factory work on my car was very poor. Screws around windows and doors were either loose or stripped. I removed the back seat looking for rattles and found several screws missing. The padding was falling out of the bottom of the back seat and one spring had broken loose." — California draftsman.

"I hit my knee against windshield post when getting into front seat."—Nebraska insurance agent.

"A driver with short legs who has to have seat close to steering wheel has trouble getting in and out past windshield post."—Rhode Island clerk.

"I don't like the racket of the overhead valves. Ford engines always ran so quiet until they went to overhead valves." — Arkansas letter carrier.

"Noisy engine. It was souped up at a sacrifice of smoothness."—

"Car is not heavy enough for the power of its engine." — Idaho farmer.

"Doors leak during hard rain."

—Alabama pastor.

"Doors difficult to close and then get stuck." — Georgia school principal.

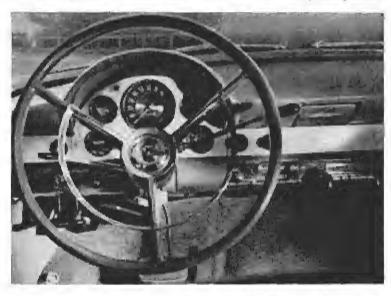
"Poor front end. Cannot keep wheels in alignment."—Michigan conservation officer.

"Front end too hard on tires."— Arkansas farmer.

(Continued to page 216)



Had no engine trouble say 74.5 percent of Ford owners; some trouble, say 21.6 percent; considerable trouble, say 3.9 percent

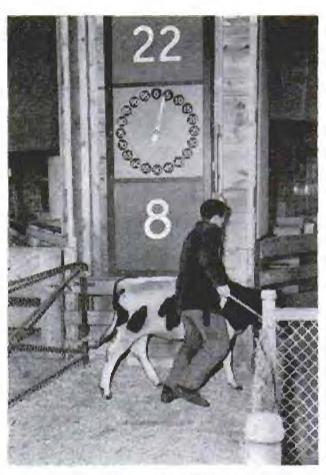


Above, owners like instrument panel and safety steering wheel. Below, they complain that padded dash makes ash-tray opening so narrow cigarettes often burn plastic covering. Some say protruding radio and heater knobs were not designed for safety





Cottle buyer pushes button by his seat to indicate he'll buy at the price recorded on auction board



Calf is sold at \$22.05 per hundredweight. The 22 on board is for dollars, the 8 is for buyer's seat

Electromechanical Auctioneer Speeds Sale of Livestock

Livestock is sold at twice normal speed with a Dutch electromechanical auctioneer installed at the Ontario Stock Yards in Toronto. Bidding follows the Dutch pattern and starts at the top price asked. The seller presses a button and his maximum perhundredweight price appears on a large screen. The hand of a clocklike dial begins to turn automatically to indicate the lower-

ing of the price by cents. After every revolution, the dollar price on the top screen lowers until a buyer presses a button by his seat. The buyer's number appears on a lower screen to indicate that the animal is sold. The system brings all offers into the open and bars private deals. The unit costs \$2000 and another \$8000 to wire up the 48 buyers' benches in front of it.

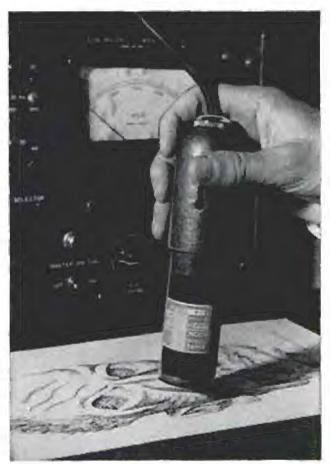


Smog Hunters "Shoot" Offenders With Car-Mounted Cameras

Attempting to reduce smog in the Los Angeles, Calif., area, officers of the Air Pollution Control District patrol constantly, warning and arresting violators of airpollution ordinances. To gather evidence for use in court, each officer's car is equipped with a special tripod which holds a camera aimed through the windshield. The officer can drive and take pictures at the same time, making it possible for him to trail a smoking diesel truck while he takes the necessary pictures. Until the cameras were put in the cars, officers found it difficult to make their charges stick when violators were brought to court. Motor vehicles account for 1050 tons of pollutants out of the 3400 released daily in the area.



Drawing with radioactive ink is done on a flat surface to keep ink from running. Ink is not dangerous



Geiger counter measures radioactivity to determine required exposure time—from half a day to six months

After exposure of design to photo paper, print is developed and fixed just as any photoprint would be

Atomic Inks for Art

By Hilda Voorhies Nystrom

DRAWING INKS spiked with radioactive isotopes are among the latest peaceful byproducts of atomic research. The "hot" ink, which may revolutionize the art of lithography, transmits rays strong enough to expose photographic print paper laid over a drawing made with the ink. The resulting print is a perfect mirror image of the original drawing, with an accuracy of detail that is almost impossible to obtain in conventional lithographic work. And thousands of copies can be made from the original drawing with no loss of detail.

The idea was conceived by Dr. Harry Wheeler, Associate Professor of Botany at Louisiana State University, who works with radioactive fungi in his research. Wheeler's wife and lithography instructor Caroline Durieux collaborated in the unique experiment.

Mrs. Durieux feels that the process will do for art what high-fidelity has done for sound—broaden the range of textures and shades. The biggest stumbling block to commercial use is the lack of a printer's plate sensitive enough to take the radioactive drawings, but Doctor Wheeler feels these will be developed before long.

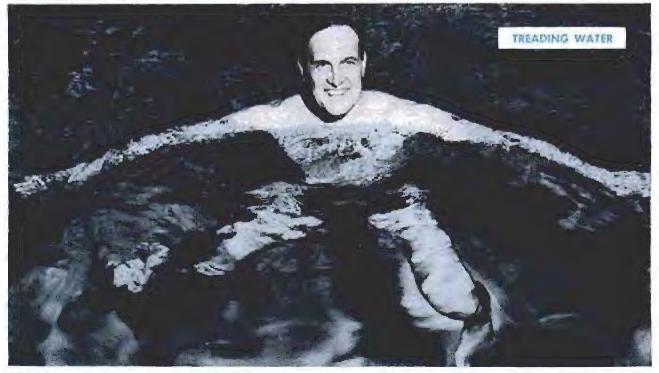




Back float is most comfortable. Bent position of legs and arms gives greatest buoyancy. Use it to rest during swimming, to float for survival in calm water. Gentle sculling or kicking may be necessary but burns energy

Vertical float is natural for some. Gently push water downward with hands in fishtail flipping of wrists. Pretend you're walking up stairs with feet close together, extending feet downward eight to ten inches at each step

Treading water uses energy fast, but helps you keep warm in cold water, is necessary in righting capsized boat. Scull with hands in figure-eight motion. Move feet as in bike pedaling or use egg-beater, frog or scissors kick



VERTICAL FLOAT

How to Stay Alive in the Water

By Elliott H. McCleary

YOU MAY BE an excellent swimmer, but knowing how and when to float is your best

guarantee of survival.

Adolph Kiefer, former Olympic swimming star, shows here the best methods of keeping afloat, whether you're waiting for rescue, have swum too far and are tired, have the cramps, are trying to right a boat or are being numbed

by chill water.

If you're in a small boat that's slowly filling with water, stay with the boat. Even with a big hole in the bottom and filled to the brim with water, it will keep afloat its rated capacity. That is true if it is a canoe or wooden boat, or a plastic, molded plywood or metal boat that has been made buoyant with plastic foam. A capsized boat will support as many persons in the water as can grasp hands across it.

James Carnahan, who supplied technical advice for this article and is Water Safety Director of the Chicago Chapter, American Red Cross, points out that the average human body is almost light enough to float unaided. Proper breathing

Drownproofing, survival float taught by Georgia Tech's Fred Lanoue, keeps you up indefinitely. Use it if you're waiting for help, if you get cramps or are tired from swimming. Below are Lanoue's rules

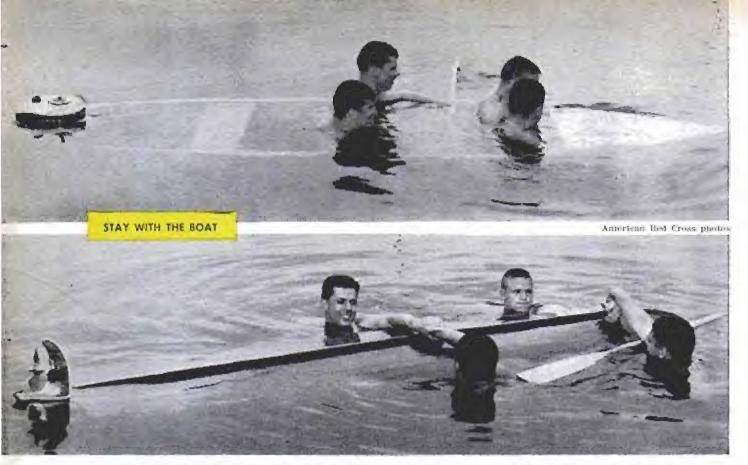
- 1. (A) With lungs full of air, float face down, arms and legs dangling, back of neck on surface. (B) get ready for slow, downward push, using arms, legs or both
- Exhale through nose while raising head just high enough to get chin out of water.
 Be sure to keep the shoulders underwater
- The instant the head is vertical make downward thrust with arms which supports body during the inhale through the mouth
- 4. As soon as lungs are full, drop face down to horizontal and immediately give another long slow thrust backward and downward. Then relax with head, arms and logs dangling, holding all air for four or five seconds while slowly floating up





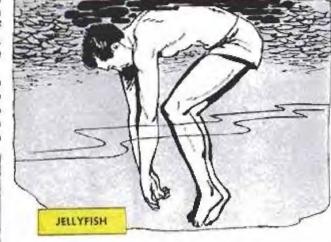






Boat completely filled with water holds its rated capacity. Passengers sit on floor. If they were on seats, boat would float lower in water. Users of capsized boat stay up by grasping hands across keel. Boat supports as many as can grasp hands across it

Jellyfish float is used when removing clothes in water. Take off one article between each breath; one shoe, then the other, pants next and shirt last. To get a breath, relax, kick and at same time push down with hands to raise head for air. Then submerge again





plus mild kicking or sculling if necessary, are all that are needed for floating. If you're thin or heavily muscled, you'll have to kick a little harder than your well-padded, more buoyant friends, for body type does make a difference. Some can read a newspaper while lying in the water. A very few are "sinkers" who can't float motionless.

In all floating, keep plenty of air in the lungs except when getting a breath. Take few breaths and deep breaths, but never wait until the last minute to breathe. Keep calm, and keep your arms below or on the water. You can't float if your arms are above the water.

You can learn the different methods shown here safely if you practice with someone who can rescue you. It's a good idea to practice floating and boat emergencies before they arise. Then, both your brain and your muscles will know what to do.

British Turbocopter

Called a turbocopter. a new British Fairey helicopter spins its rotor by means of compressed air blown through jet tips. Forward motion is obtained by a blast from a jet tube at the back of the fuselage. The jet stream plays across the rudder for easy steering and torque compensation. The pilot faces forward, while an observer faces backward in the cabin, giving the two-man crew 360 degrees of visibility.



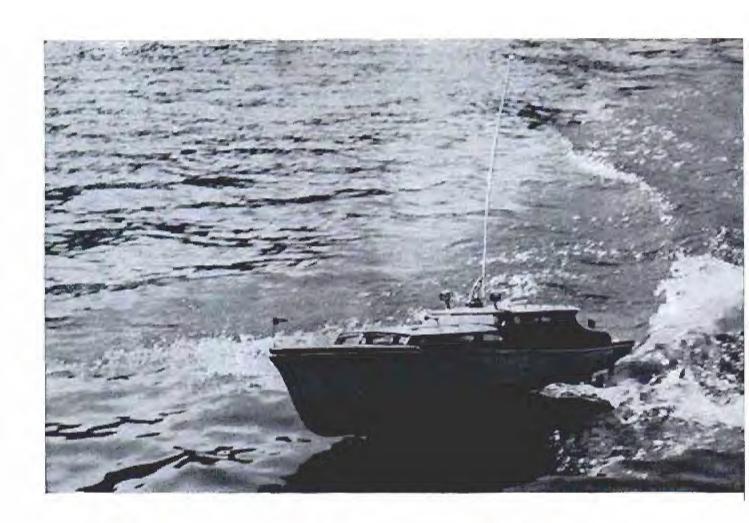
Homemade Winder Reels in Wire

Old telephone wires are reeled in with a homemade rig that looks like an extra pair of wheels mounted on the front of a farm tractor. One of the "wheels" is the wire reel. which can be taken apart so that the reeled wires can be slipped off. The other is an auto wheel that serves as a pulley for the belt from the tractor. The tractor is braked during reeling operations. The outfit was devised and is operated by Glen Ellis, a farmer of Hebron, Ind., who helps manage a rural telephone system in his neighborhood.

Sleeping Cabin Bolts to Truck

You can add living quarters to a 1/2 or 3/4-ton pickup truck by mounting a special glass-fiber cabin in the truck box. Attached or detached in minutes. the cabin can transform a working truck into a camping unit for weekend hunting or fishing trips. The truck with cabin mounted can also serve as a panel truck during the week. Four bolts with wing nuts secure the cabin to the truck box.





Mile-a-Minute Midgets

By Hal Roth

Electric motor powered by special storage battery drives this 32-foot-cruiser replica for about one hour



Five-channel radio receiver allows operator to select right or left rudder, increase or decrease speed



128



gathers to operate or watch radio-controlled model boats.

Model boats can be divided roughly into four classes: sailboats; powered racers running a circular course on a cable; freerunning power boats; and radio-controlled model boats. Each class has its devotees and amazing models with incredible control devices have been constructed. For example, Walt MacWilliams of Philadelphia. holds the world's speed record for model boats (running a circular course and bridled to a cable revolving around a center pivot) of 81.44 miles per hour.

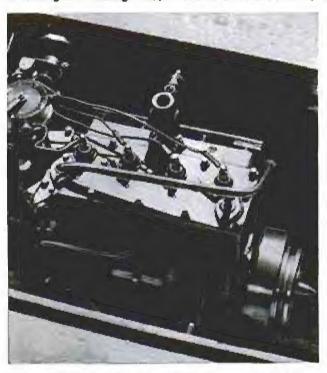
With radio-controlled boats the object is realism and full control-which includes both the cruising pattern and speed of execution. Since a typical radio-controlled boat may weigh 35 pounds and be 4½ feet long, a few extra ounces aren't important (as

with radio-controlled model planes) and very complicated control units have evolved. For example, in one radio unit, a Rockwood type, the transmitted signal can be picked up on any of five channels, each of which can operate a control (right rudder, left rudder, full throttle, siren, etc.). The radio signal causes a reed to complete a contact which impels a relay to actuate an electric motor that can operate the control through a complicated worm-gear linkage.

The power to work everything comes from batteries and the electrical equipment is designed to draw minimal current. Engine vibration is another problem since the delicate radio contacts often have gaps of only a few thousandths of an inch. Since any water in the radio gear would cause



With engines turning over, model cruiser valued at \$250 is started from shore by hand. Then radio takes over



Four-cylinder power plant built by two model-boat makers features downdraft carburetor, water cooling

Engine is started and final adjustments made with boat in water. Top is put in place and cruise begins



short circuits, the boats must be watertight, yet the equipment must be accessible. Hatches and removable cabins are usual.

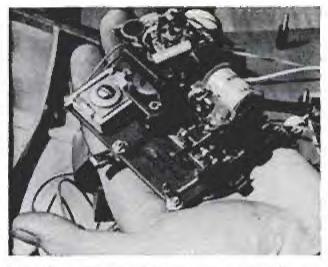
The boats have plastic hulls and are patterned after full-size cruisers. The most time-consuming chore is the making of the small detailed fittings such as spotlights, railings, flags, horns, etc., although kit manufacturers are beginning to supply custom fittings.

Driving power comes from an inboardmounted engine, usually of a four-strokecycle design since high revolutions per minute are not required and a smooth-runing low revolutions per minute, more powerful engine is better capable of a sustained cruise without overheating. Most of the engines are built by the modelers themselves. Model plane engines of the glowplug type (two-stroke cycle) are sometimes used, but the inability to throttle down, excessive fuel consumption and considerable vibration make them less popular. The engines are usually cooled by picking up water, running it through a cylinder head shroud, and discharging it overboard.

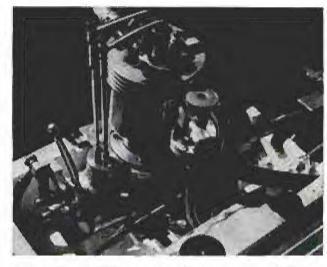
Radio control of the engine speed is by spark or fuel adjustment. A small reversible electric motor controlled by the radio can be connected with the spark distributor or two sets of ignition points (high and low) can be used. The other method is to fit the carburetor with two needle valves (high and low speeds), each controlled by a radio-actuated butterfly, but this is often unsatisfactory for idling or slow cruising.

A second radio frequency for modeling purposes has recently been granted by the FCC. Heretofore each model had to be run in turn, i.e., only one radio transmitter and one model could be operated at a time, otherwise the signals would overlap. Now with two radio bands, two boats suitably equipped, can run together.

Although the old timers (after one successful run you're an old timer) generally



One-tube radio operating on 27 megacycles is used for simple control. It has range of about one mile



Four-cycle gasoline engine built for model below

favor large, moderately powered boats, newcomers sometimes construct small boats and install very powerful engines. "A very ticklish combination to test," says one old pro. The vibration of the high speed engine is likely to upset the sensitive radio contacts. Then you hear:

"Look out! It's heading for the concrete ramp. It won't rudder. It won't rudder. The radio won't work, Look out!" shouts the distraught modeler.

And with a hollow crunch the hull telescopes itself against the concrete dock as radio tubes, wires, condensers and motor parts spill out into a tangled mess.

Having perfect remote control of a model power boat is quite a thrill and such spectacular crashes are fairly uncommon. "Bring her alongside the dock at full throttle.

The modeler busily hunches over





Platform on pole at shore end of floating fire barrier is control station for operating 400-foot booms

Floating Fire Barrier Protects Boston Harbor

View from beneath installation, showing the hollow steel booms which would be lowered in event of fire



FIFTY-ONE PERCENT of all the oil storage tanks in New England are located along the banks of the Chelsea River above Boston Harbor. There is always a certain amount of seepage entering the water and, as a result, there is danger of surface fire which might spread to the shipping in the harbor itself. To prevent this, the Port of Boston Commission has built the world's first waterway fire-prevention boom, locating it across the Chelsea at the point of confluence with the Mystic River. The floating boom would enable the Boston Fire Department to close the waterway in the event of fire, and prevent flaming oil from floating down into the shipping lanes. The controlling device consists of two 400-foot hollow steel booms, built in 40-foot sections connected by universal joints. They can be moved both vertically and horizontally, and are suspended under a steel walkway. Control panel to operate booms is located on a platform on the river bank.

¶A patent has been granted to a New Jersey inventor on a method of controlling the sex of chicks so that a poultry farmer can hatch either all male or all female chicks, as desired. The method is to dip fertile eggs for five seconds into a bath of male or female hormone.



Woven fabric held in the fingers is dipped in hot water. Some fibers shrink to produce puffed fabric



Fabrics in three dimensions are now possible through a new technique of controlled shrinkage. The fabrics, developed by United States Rubber Co., are woven flat but are given permanent pockets by dipping them in boiling water. Woven on a regular loom, the fabrics combine conventional fibers with polyethylene yarn. The boiling water shrinks the polyethylene, forming puffs in the fabric. The puffs will not collapse or flatten out permanently even after periods of long compression. The first use for the fabrics will be in upholstery, including automobile seats. Eventually it may be used for rugs, with the rug and underlayment combined in one piece.

Remote-Control Wiring Device Eliminates Central Transformer

Remote control of lighting fixtures in the home became practical when the low-voltage relay system was introduced. However, the operation depended on a centrally located transformer and it has been restricted to new homes. A new individual low-voltage wiring device with a built-in transformer fits into the average outlet box and requires no central transformer. It can be installed easily in either old or new houses. The wiring involved in such an installation is simpler since there is no need to wire each relay back to a box.



Half of this piece has been dipped, other half remains flat. Below, fabrics are made in many designs



Iceberg's Age Told by Oxygen Content of Bubbles

Scientists report that they may be able to determine the age of an iceberg by testing gas bubbles trapped in the ice for oxygen content. Ice formed 1,000,000 years ago contains bubbles with a slightly lower oxygen content than that of today's atmosphere. This suggests that the cold climates of that age might have curbed the photosynthetic activity of green plants.



Passengers enjoy themselves on monorail roller coaster, biggest hit on German fair circuit in recent years

Monorail Roller Coaster is Fun Ride at German Fairs

Future spaceship pilots test their nerve by riding a new monorail roller coaster in Hamburg, Germany. The design of the roller coaster follows that of a monorail railroad built near Cologne several years ago. As an amusement device the monorail has been one of the biggest hits on the German fair circuit this year.



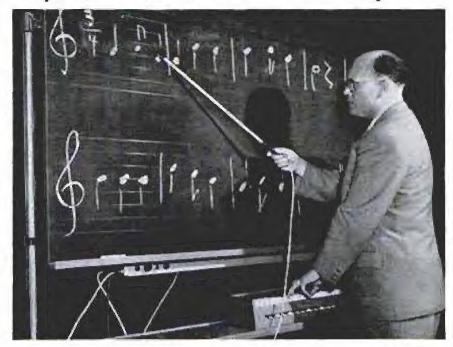
Inventory Computer Cuts Army's Red Tape

Months of paper work are converted into minutes of push-button operations by a \$4,000,000 computer purchased by the Army. The complex machine, developed by RCA, can electronically "read" or "write" at a rate of 10,000 letters or digits per second. It will be used by the Ordnance Tank-Automotive Command to control replacement parts for vehicles. It can determine in minutes the supply of any item at any ordnance depot in the nation and can forecast future requirements. There are 200,-000 different categories of these replacement parts, ranging from bolts to engines. Inventory records are stored on reels of magnetic tape which are run through the machine at 80 inches per second.

Musical Blackboard Plays for Students in West Germany

Music teaching is speeded by a tuneful electronic blackboard invented by E. Ahlborn in Germany. Notes are written with ordinary chalk on the fixed lines of the blackboard. Touching the notes with a pointer completes an electrical contact and the corresponding notes are sounded on an electric organ. A keyboard is used in conjunction with the blackboard to add tones for a chord.

Teacher touches note on board and note sounds on organ. Small keyboard is used to add other tones

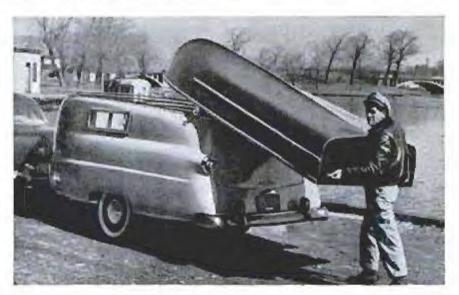


When Bridges Fail— Take to the River!

Getting a truck loaded with a 24-ton boiler plant across a river in Colombia proved a tough task, for the bridge wouldn't take the load. Finally, with a bulldozer towing it, the "semi" forded the stream. The bulldozer was again enlisted to push the truck back up on the highway. The boiler plant, destined for a tire factory in Bogota, remained in a seaport for five months before a mover was found. The 437-mile journey took seven days.

Roof of Trailer Turns Into Boat

Sleeping two people comfortably and boasting a compact little kitchen, a new automobile trailer features a built-in boat. The boat, a 12-foot glassfiber model turned bottom side up, is used as the roof of the trailer. The boat can be lifted down and put in the water in five minutes. A windproof cover protects trailer's contents when the boat is in use.



JULY 1956

They're Making ARTIFICIAL MOONLIGHT

By Thomas E. Stimson, Jr.

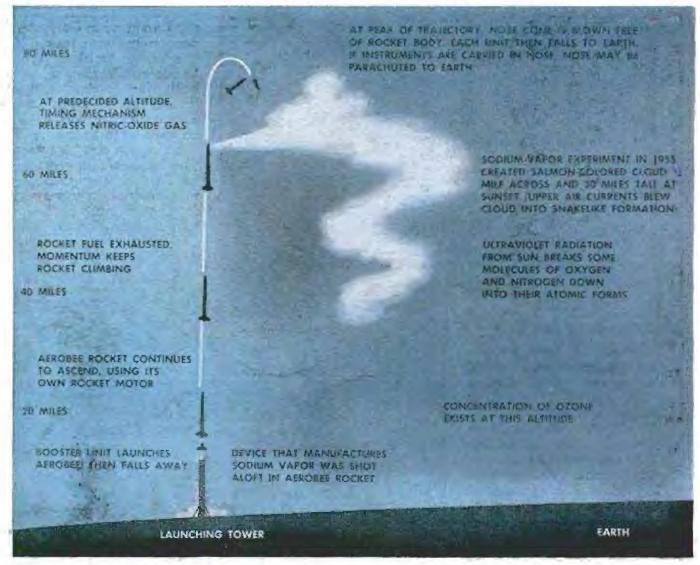
LUMINOUS CLOUDS that shed artificial moonlight over large areas can be created at will, though at very great expense. That's the conclusion of Dr. Joseph Kaplan and other aeronomists who are studying chemical reactions that take place in the upper atmosphere.

In one recent test an air glow twice as bright as Venus and about four times the apparent diameter of the moon was produced 60 miles above the earth. The glow lasted for about 10 minutes. It was created by nitric-oxide gas that was released from an Aerobee rocket.

The gas behaved like a catalyst and caused pairs of atmospheric oxygen atoms to unite into molecules, a reaction that produces light. The experiment paralleled a natural phenomenon that occurs in the upper atmosphere: Oxygen molecules broken

apart by solar radiation during the day are later recombined, producing a portion of the very faint air glow known as the "light of the night sky." Infrared and ultraviolet radiations as well as visible light are emitted in the process.

Scientists say there's a chance that enough infrared, or heat, is produced to provide the energy for driving a rocket ship at high altitude for almost any length of time. Already, in small-scale laboratory studies, enough heat has been created to turn a piece of metal red hot. For upper-air transportation they visualize a ramjet type of power plant, virtually an open tube. Oxygen atoms that enter at one end would strike a mesh of catalytic material and would form into molecules that would exhaust at the other end of the tube, the heat of the reaction providing useful thrust.



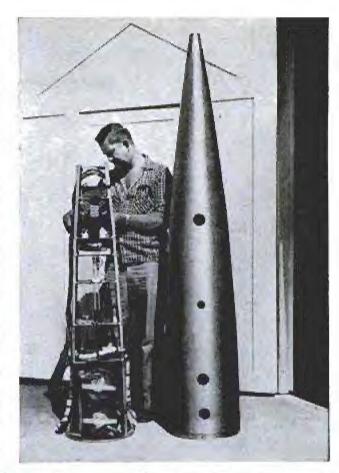
Technician installs color movie camera in instrument rack of Aerobee rocket. Two sodium generators used in first test are at bottom of rack. Rack is housed in nose cone at right. Holes in nose cone, from top, are for camera, photometer and for gas emission

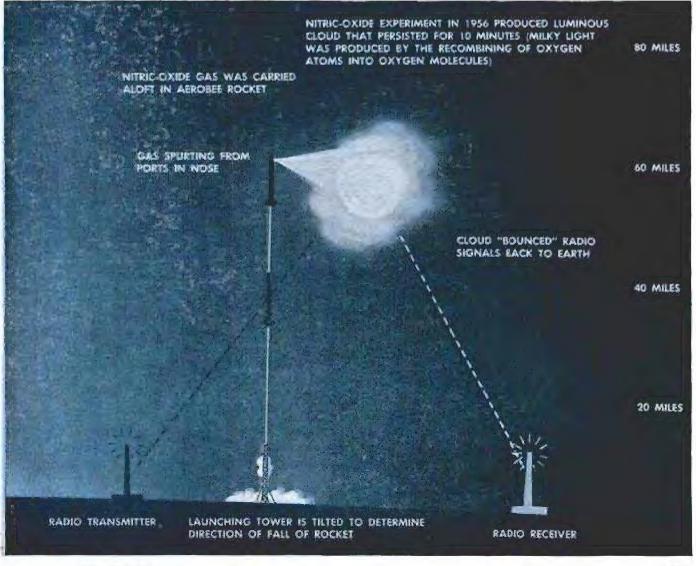
The recent luminous-cloud experiment was performed at Holloman Air Force Base in New Mexico by a team from Cambridge Research Center under the direction of Dr. Murray Zelikoff. It is part of an extensive program for investigating various chemical reactions that take place in the upper atmosphere, many of which already have been duplicated in the laboratory. The nitric-oxide experiment, for instance, was first demonstrated in evacuated glass chambers at UCLA under the direction of Doctor Kaplan, head of the university's physics department.

Other air glows under study in the laboratory include the combination of atomic nitrogen and ozone, atomic oxygen and ozone, and the mixture of atomic hy-

drogen and nitrogen.

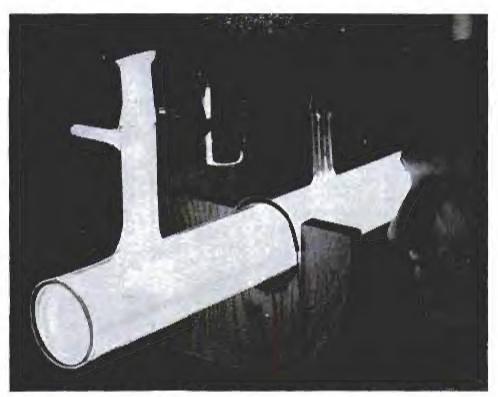
In a prior investigation at Holloman, the Air Force scientists created an immense sodium-vapor lamp in the twilight sky. Four pounds of sodium vapor were





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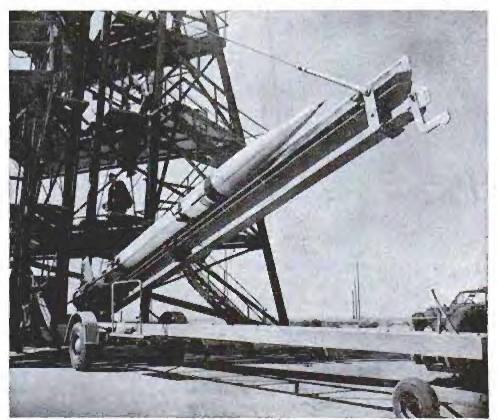


Action of nitric oxide on atomic oxygen produced milky light in tube in lab test

expelled from a rocket during the time it was ascending from 40 to 70 miles altitude. The resulting cloud, half a mile wide and 30 miles tall, gave off a dim, salmon-colored light that continued to glow well after the sun ceased to illuminate it. New information about conditions in the upper atmosphere, including the mechanism by which atmospheric sodium is excited, was obtained.

The nitric-oxide gas experiments indicate that luminous clouds producing twice the light of the moon and lasting for hours could be made. A series of the clouds could also act as reflectors to bounce radio waves along a desired path.

Rocket was launched, left, from 142-foot tower. Below, it is raised into position





Type font of one language is quickly exchanged for that of another. Operator follows some code for all



Operator unfamiliar with language follows code of interpreter. Below, coded words and printed result

Versatile Army Typewriter Prints in 50 Languages

Army typists who know only English can now type messages in over 50 languages on one machine. The 40-pound unit, a modified Vari-Type with interchangeable type fonts, would be used in communicating with native populations. A linguist, following a code, transcribes the message into numbers for characters; diagonals, circles and squares for punctuation. With the proper font in the machine, the operator punches the keys that correspond to the figures on the paper and the message is reproduced in a form resembling commercial printing. The result is photographed, a plate is made, and printing begins. The machine is equipped to cope with languages as complex as Burmese, which has over 700 characters in its alphabet. A reverse-carriage model types from right to left in writing such languages as Hebrew, Arabic, Persian, Jowi, Urdu, Malayan and Pushtu. The compact machine will be used in mobile printing units.



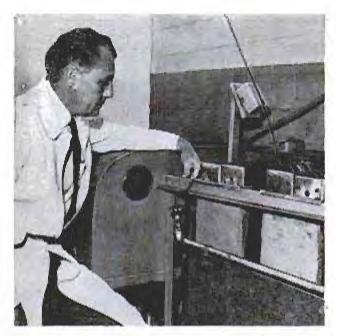
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Two-Pound Cookstove Burns Ultrasafe Fuel

Campers can now heat their food on a two-pound stove that fits into a knapsack and burns a solid that can't explode, melt, run or spill. The solidified naphtha-gasoline fuel produces a blue-white, odorless, carbon-free flame that is hotter than alcohol, kerosene or gasoline. Each fuel container weighs 2.54 ounces and will burn approximately 72 minutes. Two aluminum cooking utensils of one-quart and 1½-pint capacities enclose the four by five-inch stove when it is not in use.



Motor that turns drive shaft is encased in housing beside Bailey. It is gauged by automobile speedometer

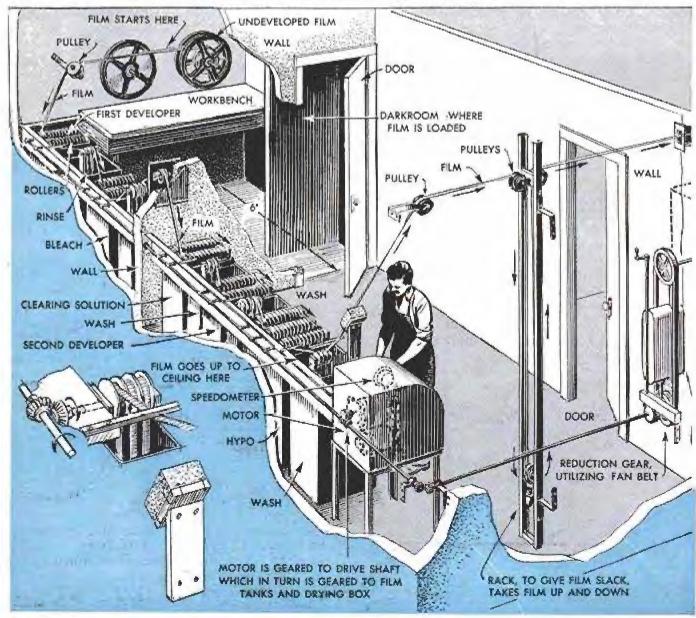
"Ruse German" Film Developer

TECHNICALLY, the rumbling monster that sprawls through three tiny rooms of Bob Bailey's Houston, Tex., photo lab is a motion-picture-film processor.

It looks like nothing else on earth because Bailey built it without ever having seen a commercial processor.

He decided in 1951 that he wanted a film processor that would do some things he'd been told commercial models either couldn't do or did poorly. Into it went such things as windshield wipers, a floor fan, rubber hose, a kitchen sponge, auto fan belts, baby diapers and the speedometer from an ancient Ford.

Drawing gives cutaway view of entire process in which 16-millimeter movie film is developed and dried

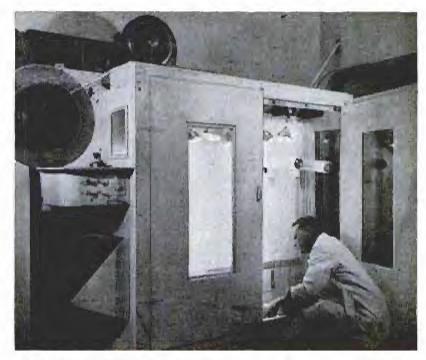


Into one end feeds undeveloped 16-millimeter film. With the first developing tanks inside a light-tight room, the film can be developed "by inspection"—unusual in movie-film work. Then the film goes through the wall, through more solutions, over and around pulleys until it passes through a wall into the third room where a large drying box full of heat lamps dries it thoroughly.

The entire process takes less than 10 minutes. And the erratic route is actually carefully planned to provide more flexibility of operation. Film or leader breaks can be repaired as the machine continues running, powered by its half-horsepower electric

motor.

It took Bailey and a me-



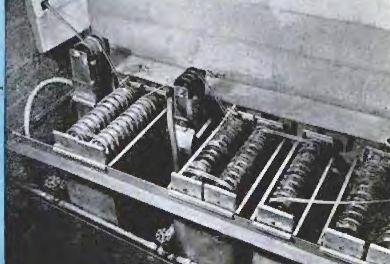
Drying box is about twice the size of comparable commercial units to allow for drying all kinds of reversal and positive film. Fan on top circulates air through drier. Dried film is wound on spool at left

HEAT BULBS
DRYING BOX
FILM EXITS HERE
TAKEUP SPOOL

FILM RUNS OVER ROLLED DIAPERS IN BOX TO SPEED DRYING chanic friend five months, \$6000 and many headaches to make the machine. Bailey is glad he built it. As a result, he's the major film processor in the area. He's now planning another "monster" to process color film.

But he's not encouraging anyone else to follow suit, for several reasons. He's an inventor with a creation he can't patent. Even if he could, it wouldn't sell. "How," he grins, "could I package and sell something that looks like that?"

Film passes in and out of each tank many times. First developer, bleach are in 20-gallon stainless-steel tanks

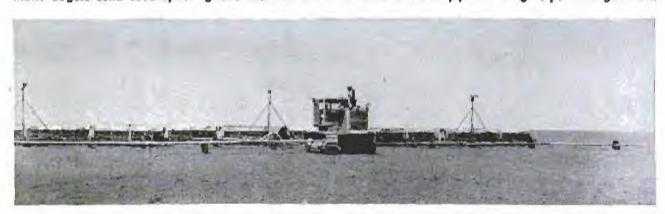




Seed for the huge machine is hauled in trucks. Automatic augers send seed spouting into the drill bins



Intricate hitch, supported by 23 wheels, is made of steel beams and pipe. Floodlights permit night work



Machine stretches across Texas farmland. Made by assembling 11 standard drills, it plants swath 154 feet wide

Planter Covers 1280 Acres in One Day

Sweeping across the plains of Texas is a giant farm machine that plants 70 acres of wheat per hour. The planter was designed and built by Tom Moran of Dumas, Tex., who uses it on his 11,600 acres of farmland. The giant machine plants a swath 154 feet wide. Moran hooked together 11 standard 14-foot drills with an intricate hitch made

of H-beams and pipe. Twenty-three rubber wheels support the hitch. Floodlights on the hitch permit 'round-the-clock operation. Seed trucks with automatic grain augers load the drill bins. It takes about 45 minutes to refuel the big tractor and reload the drills. One man operates the hitch which plants about 1280 acres in 24 hours.



Elephant Grass

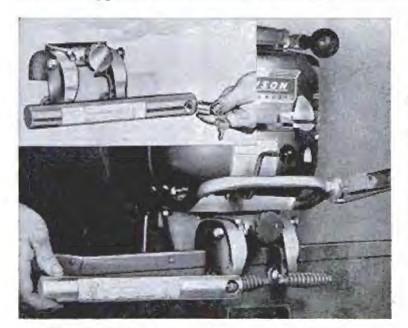
All farm animals except sheep will eat a giant grass imported to Texas from Puerto Rico and Hawaii as a possible new range fodder. Commonly known as elephant grass because of its size, the plant grows as tall as 16 feet when fertilized and irrigated. Under range conditions it grows in clumps four to five feet tall. Well over 60 tons of cuttings suitable for feed lots are obtained per acre, per year, when grown as a crop. Economic studies of the grass are being conducted at San Antonio.



Experimental Typewriter Types Words and Phrases

At the touch of a single key button, a new experimental typewriter prints any one of 42 words or phrases, each having 18 characters or less, at the rate of 150 words per minute. The typewriter is a standard electric machine, while connected to it, out of sight in a desk drawer, is a memory system. The typewriter retains all its normal

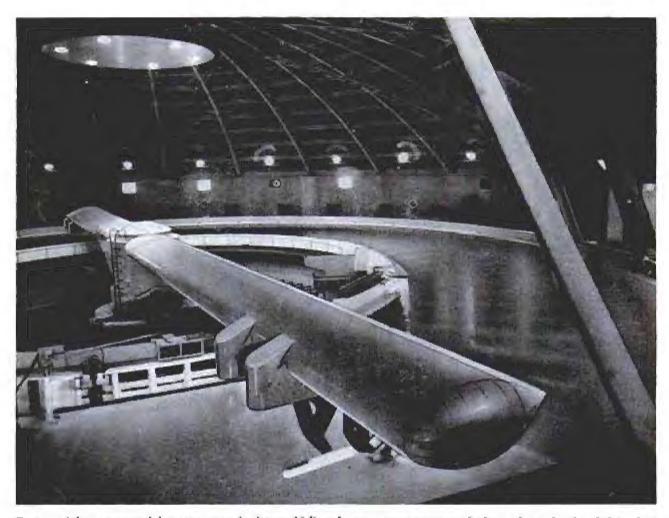
functions until the typist touches a foot switch. Then each key types a word or phrase which it has been assigned. The typist decides what is to be stored in the memory unit, and because of this memorizing the code is easy. At present the machine is experimental and no plans have been made to market it.



Outboard-Motor Lock Prevents Theft

There's no need to remove an outboard motor from the boat every night when a small lock is used as protection against theft. A split tube is slipped over the motor clamps and the key-operated lock inserted in a hole in the tube. The tube fits all motors with cast-type handles, and a converter is available for smaller motors with pin-type handles. The lock also keeps motor clamps from loosening through vibration.

(Shipments of finished steel products in 1955 totaled 84,717,444 net tons, highest in history.



Test models, supported by strut attached to whirling beam, are run around channel at depth of five feet

Whirling Beam on Circular Tank Tests Boat Models at 100 Knots

Scientist-frogman makes underwater adjustments on model prior to test run



WHAT wind tunnels do for aviation research, a new testing tank may do for underwater studies. Models underslung in the water of the 1,000,000-gallon circular tank are sped at 100 knots. drawn by a rotating beam that spans the diameter of the tank. The metal beam is 122 feet long and weighs 60 tons. The test facilities are located at the Admiralty Research Laboratory at Teddington, England. Another feature of the Underwater Hydrodynamic Research facilities is a 29-foot-deep tank with a glass wall for observation. Missiles and other objects are shot down into the water for study of the behavior of bodies launched into the water from the air.

Radio Plesi Electronics

Station-to-Station

This new, FCC-approved transceiver provides practical radio communications over an unobstructed radius exceeding 10 miles. It is said to operate successfully at one half mile through almost any obstructions. You don't have to be a technical expert to use these units. Simply plug them into any standard 115-v. a.c. or 6-v. d.c. power source, push a button, and you're on the air. No tuning is required since all units are factory adjusted to a frequency of 465 megacycles. A station license is easily obtained by any U.S. citizen over 18 years old, merely by filling out a simple form.

Each unit consumes only 18 watts of operating power.



Hi-Fi Goes Modern

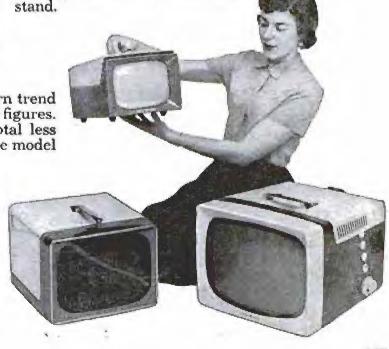
the sphere in its removable

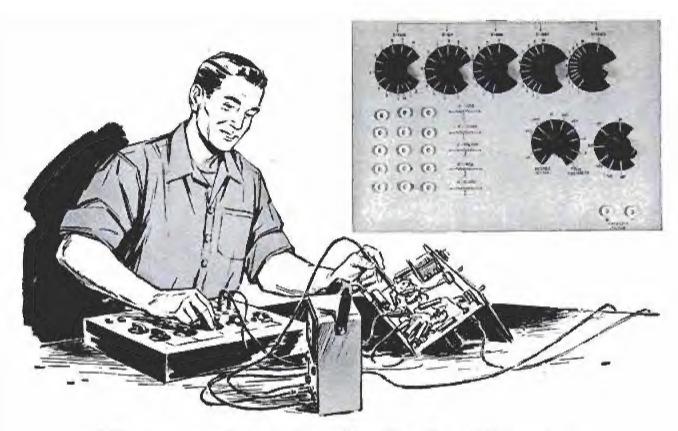
Departing from the usual cabinet design, this new high-fidelity-speaker system is styled to harmonize with contemporary furnishings. The lightweight foam-plastic sphere, only 18 inches in diameter, is designed as an infinite-baffle enclosure which provides essentially flat frequency response from 40 to 19,000 c.p.s. with its built-in 8-in. coaxial speaker. The enclosure is available separately, if desired. The spherical shape is said to improve sound dispersion of all frequencies. The sound can be directed to any desired point by rotating

In Step With the Times

Television is following the modern trend towards lighter weight and slimmer figures. All three of the sets illustrated total less than the weight of the smallest table model

available five years ago.
The small 13-pounder being held-by the young lady includes 12 tubes plus five semiconductor diodes and two rectifiers. Its 9inch picture tube is large enough for comfortable viewing. Largest set has 17-inch picture tube and weighs only 32 pounds. Sets will operate with fold-away rabbit-ear antennas which can be attached to the back of the case.





Versatile R-C Substituter

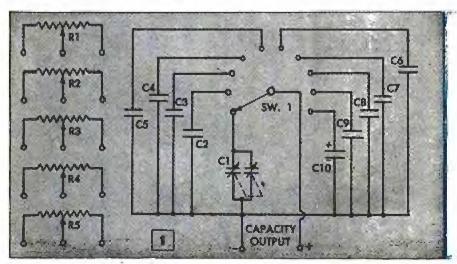
HETHER you are an experimenter or a serviceman, a resistance-capacitance substitution box can be a valuable addition to your workbench. While not considered a piece of test equipment, the applications for such a unit are so numerous that it may quickly become one of your most-used instruments.

To demonstrate the versatility of this substituter, let's look at some of its more

important applications.

To determine if a capacitor in an electronic circuit is open circuited, the sus-pected unit is "bridged" with a new one of similar value. Even if this new unit is available, bending its fragile leads so that they make good contact at the desired points requires a steady hand and considerable concentration. With the substituter the job is greatly simplified because any required value can quickly be clipped into the circuit, leaving both hands free for other tests.

Hum and noise-producing amplifier stages are commonly isolated by shortcircuiting the control grids of the various tubes to B- with a metal screwdriver. In a crowded chassis, this is often difficult because the tube-socket terminals are not accessible. With the substituter, the 40mfd. capacitor is used for this purpose. The capacitor shorts out any signal, hum or noise voltage without disturbing the d.c. voltages. By clipping the negative lead to B- and using the other as a probe, this test is accomplished rapidly and efficiently.



LIST OF MATERIALS

POTENTIOMETERS

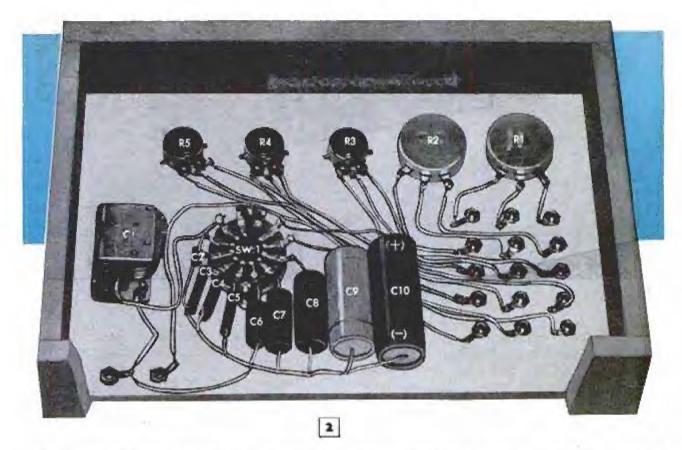
(all linear taper)
R1=1,000 olume, 4 wgtt w.w.
R2-10,000 ohms, 4 wgtt w.w.
R3-100K ohms, carbon
R4-1 megohms, carbon
R5-10 megohms, carbon

CAPACITORS

C1-variable (any value)
C2 through C9-.001, .0022, .0047, .01, .022, .047, .1, .5 mfds, .10-.40 mfd, .450 v. electrolytic (any desired capacitor values may be substituted)
SW1-11-position rotary switch (Mailory type 12 h1L)

MISCELLANEOUS

pin jacks (17), pointer knobs (7), test leads, hookup wire, solder (rosin core), wood for panel or



How often have you soldered one resistor after another into an experimental circuit before finding the value which gave best results? This time-consuming job is virtually eliminated by the substituter. Just clip in a potentiometer and adjust its value for optimum performance.

During the course of an average day's work, the serviceman or experimenter will undoubtedly find numerous other tasks which are simplified or speeded up through the use of a substitution has

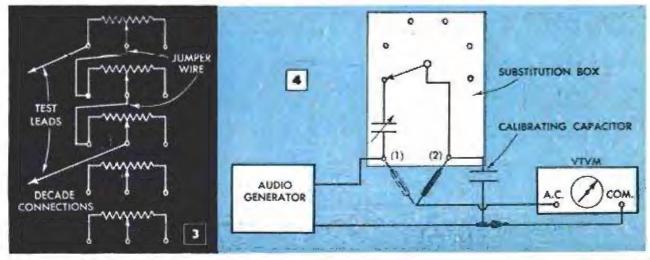
the use of a substitution box.

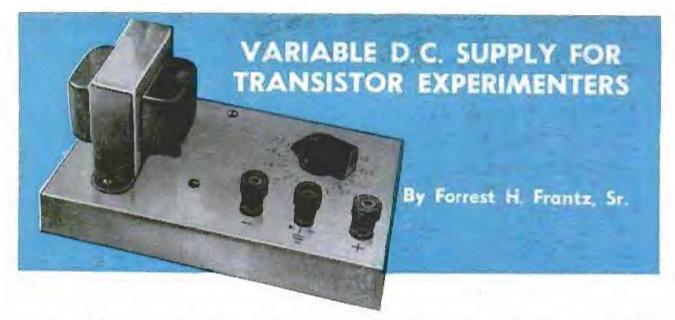
The construction of this substituter is shown schematically and pictorially in

Figs. 1 and 2.

For maximum versatility, each potentiometer is wired so that it can be used by itself, either as a control or as a variable resistor. By connecting jumper wires between various jacks, the unit is converted into a resistance decade as shown in Fig. 3.

An ohmmeter is used for calibrating the individual controls on homemade dial scales which are glued to the panel. Standard, fixed capacitors, connected to a multiposition rotary switch, provide a large number of capacitor values. To reduce the required number of switch positions, a variable capacitor is used to obtain low values. This unit can be calibrated with a capacity bridge or an audio-signal generator and vacuum-tube voltmeter. Fig. 4 shows the calibration setup for the generator-meter method. The generator, set for the highest volume and frequency output, is connected as shown. When the variable is rotated to the point where the voltage at (2) is exactly half of the voltage at (1), the capacity of the variable is equal to that of the calibrating capacitor.





TRANSISTOR experimenters will appreciate the usefulness of this variable d.c. power supply. It is simple and inexpensive to build, but provides all the flexibility needed for transistor work. Thus, the need for separate batteries, with their shelf-life limitations and interconnecting difficulties is entirely eliminated.

The open-circuit output voltage of the power supply is variable from zero to approximately 50 volts, while maximum current, with the supply short-circuited, is about 8 ma. This current is purposely limited so that there is little danger of damaging a transistor provided that the correct voltage polarity is applied to its elements. Since the output voltage of the supply drops rapidly as load current increases, a directly calibrated dial is not practical.

In the model, the control is calibrated from zero to 10, but this has little bearing on the actual output voltage. Note, however, that there are two sets of calibration numbers: one with the zero point on the left, the other with the zero on the right. This is necessary because the power supply can be used with either a negative or posi-

tive ground, an essential feature for transistor work. The desired polarity is obtained by using either the negative or positive binding post in conjunction with the grounded one.

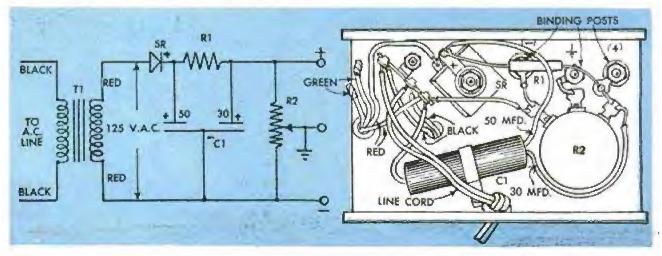
For transistor circuits requiring more current, the maximum output may be increased to 15 ma. by reducing R1 to 10,000 ohms. Lower values should not be used to prevent damage to the transformer.

Schematic and pictorial diagrams for this simple power supply are shown below. When installing the binding posts, the two outside ones, (+) and (-), should be insulated from the chassis by means of shouldered fiber washers. The center one is not insulated. The color-coded leads in the pictorial are from the power transformer mounted above the chassis. The green wires are the unused filament leads.

In use, the supply voltage can be monitored with a vacuum-tube voltmeter.

LIST OF MATERIALS

T1=Stancor PS-8415 power transformer (secondary, 125 v. 15 ma.); R1=22,000 ohms, 2-watt; R2=10,000 ohms, 3-watt pot.; C1=50-30 mfd./150 v. elec. cap.; SR=selenium rectifier (2) ma.); 3 binding posts (2 insulated); aluminum chassis; line cord with plug; pointer knob; 3-lug terminal strip; hookup wire; solder.







YOUR PATIO

with this ranch-modern furniture. Complete set of five pieces brings all the comforts of indoor living outdoors-all summer long

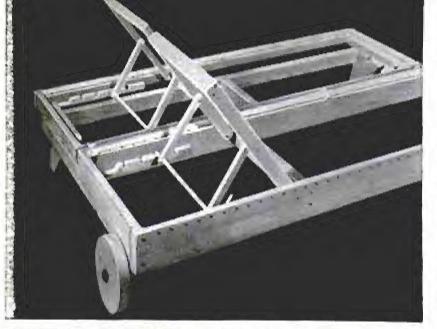
PART I

NEED SOME lazy furniture for your patio? You'll want to copy these unusual designs that Tom Riley sends us from the West Coast. Set includes two-way lounge, barbecue cart, chuck counter, patio "wheelchair" and drop-leaf planter. Part I details the construction of the lounge and cart. How to build the others will be described next month.

The Two-Way Lounge

The two-way lounge is a novel piece of patio furniture. As pictured above, it serves a dual pur-pose. Raise the adjustable backrests and it becomes an inviting twin lounge for two persons. Raise just the back and the piece converts to a large, comfortable sofa which will easily seat four people.

The two-way lounge is designed to take two standard 24 x

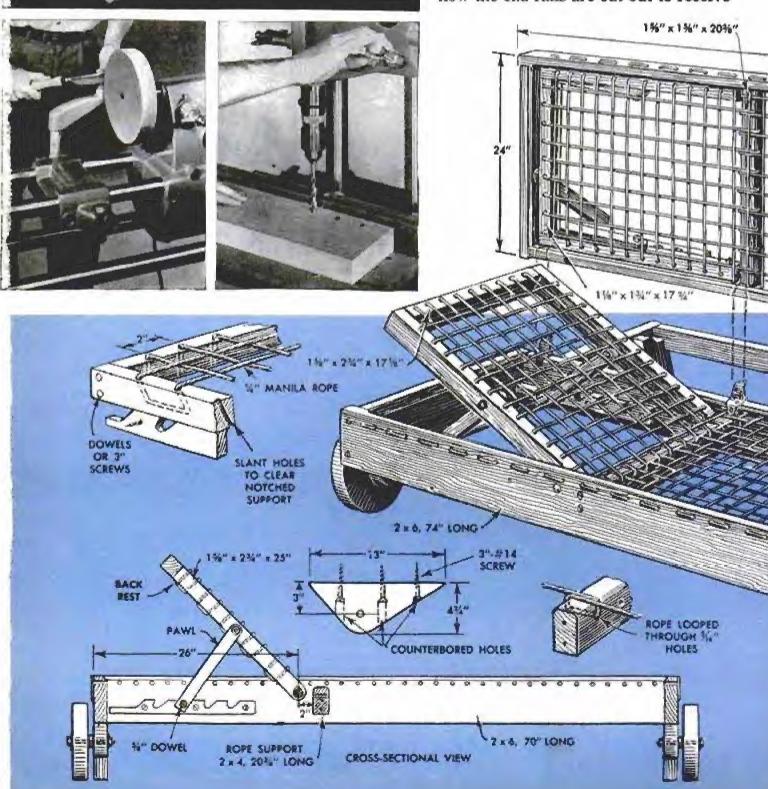


Left, rear backrest is made narrower than front one to permit it to retract flush in doveno back

Below left, lounge wheels are trued on lathe after being rough-sawed from 2 x 10 material

Below right, fence on drill-press table aligns rope holes so all will be ½ in. in from edge

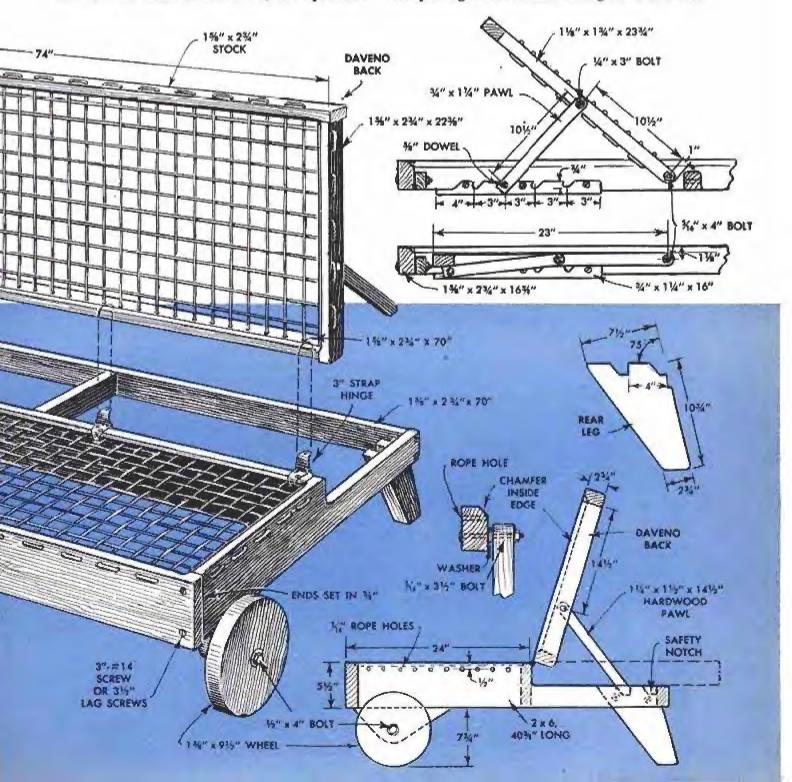
72-in. cotton-filled or foam-rubber pads. Redwood makes the most durable frame although you can use regular lumber-yard material, such as fir or pine, and paint it. The front, center and end rails of the stepped frame are cut from 2 x 6 material, while the narrow back rail can be ripped from a length of 2 x 4. Notice how the end rails are cut out to receive

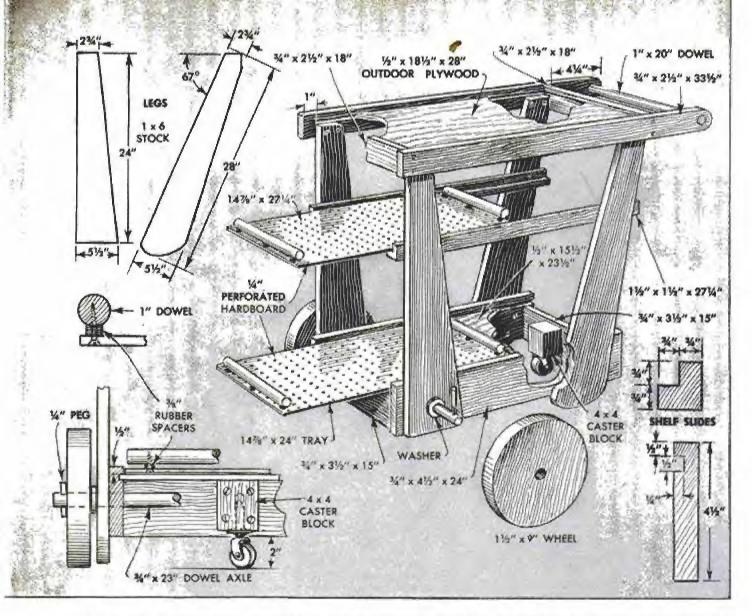


the separate hinged daveno back. Rope holes are spaced 2 in. apart, on centers, and 1/2 in, down from the top edge. The holes are bored along the full length of the pieces even though the rope is not laced crosswise past the backrests. Before the frame members are screwed and glued together, the inside upper edges are chamfered as indicated. The wheels are bandsawed from 10in, stock, lathe-trued and then mounted to triangular-shaped brackets glued and screwed securely to the front corners of the frame. Use washers on the wheels to provide clearance. Follow the pattern in cutting the rear legs and notch their tops to engage pawls which support the daveno back. Both front and rear sections of the frame are braced with 1%-in. spreader

members, the upper edges of the front one being rounded. Holes are bored through the latter for the rope. Both adjustable backrests are supported by pawls fitted with \(^5\seta^-\)in. dowels which hook in notched members screwed to the inside of the rails. Notice that the rope holes in the side members of the backrests are bored at an angle so the rope will clear the notched pieces.

The daveno back is assembled similarly, the holes being spaced the same and the rope woven in a similar manner. Since the frame members of the daveno back are narrower than the front pieces, the backrest is made of 1\%-in. stock to permit it to fold flat and even with the rest of the back. Four 3-in. strap hinges are used to hinge the back to





the lounge frame and the ends of the hinges are bent over as shown. Be sure the inside rail of the daveno frame is set in % in. to provide room for the rope.

Paint Before Stringing Rope

Whether you paint or stain the wood, it should be done before stringing the rope. Thread the rope lengthwise first, back and forth from the top of the backrests, through the rope supports and to the far ends. Leave enough slack at the rope-support pieces to let the backrests fold down; then weave crosswise, stretching the rope tightly by hand. You'll need about 300 ft. of 1/4-in. manila rope. The rear lounge pad will ordinarily stay in place when the daveno back is up. But if you wish, you can attach it with four of the pad's upholstery buttons. Snip these off and attach them to short lengths of fine wire. Then push the wire through the pad and secure to the rope.

Making the Barbecue Cart

This rugged serving cart is designed for outdoors—and for service. Its three levels will hold the makings of a complete dinner. The two lower shelves are actually trays that slide out from either end for ease of

loading and unloading. The cart utilizes a single caster at the rear so the cart need not be tilted as it is pushed about.

First build the two boxes that form the top and bottom shelves. You can use any clear ¾-in. material for the boxes and legs. Dado 1/4-in. grooves into the sides of the lower box and into the sides and ends of the upper box for plywood tops. An excellent idea is to cover the top shelf with counter-top plastic. Cement the plastic to the plywood before assembly and increase the width of the groove for the extra thickness. Assemble the boxes with waterproof glue and galvanized finishing nails. The legs are secured to the boxes with glue and 11/4-in. screws driven from the inside. The center tray guides are fastened in the same manner. After attaching the legs, drill two 34-in. holes for the dowel axle. The two wheels can be bandsawed or turned. Small 1/4-in. pegs hold them on the axle. Use washers between the wheels and frame for clearance. A 2 or 3-in. ball-bearing furniture caster will serve at the rear. This is fitted in a wooden block glued to the underside of the plywood and to the rear of the box on the inside.

(Continued next month)

More Storage SPACE IN YOUR HOME

By Ed Packer

ACK OF STORAGE SPACE, a problem in many small apartments and in some homes, often can be solved by installing shell-type cabinets and by the use of drawers and fixtures located in areas not normally considered usable for storage. The area above a radiator or behind a door in a kitchen, for example, is an excellent location for a high, shallow cabinet, Fig. 1, that will accommodate brooms, mops and an ironing board. This cabinet is a shell type, which means that it consists of a frame of 1 x 2 lumber over which is nailed 1/8-in. hardboard. The frame is nailed or screwed directly to the wall and, if possible, should be positioned so that the nails or screws are driven into the 2 x 4 studding.

Fasten to Studding

In some cases it may be necessary to add one or more cross pieces at the back of the frame through which screws can be driven into the studding, to assure that the cabinet is firmly attached to the wall. Corner angles can be used to brace the frame of a cabinet that does not seem rigid enough. The wall forms the back of the cabinet, and in some cases the ceiling will be the top. If a cabinet is located in the corner of a room, the adjacent walls can be used as the back and one side of the cabinet. Shelves in the shell-type cabinets are cut from 1/4-in. plywood and are supported on 1/4-in. rods fitted in aligning holes drilled through the vertical front members of the cabinet and through the back members. If Shell-type cabinet over radiator or behind door provides storage for mops, brooms and an ironing board

it is desired to make the shelves adjustable, drill a line of holes at each location. Fitting the rods in different holes permits quick adjustment of shelf spacing.

Portable Clothes Pole

Cramped quarters also present problems in doing housework, such as when ironing shirts, dresses and other garments that must be hung on coat hangers rather than being folded for storage. A portable clothes pole is the answer to this problem. The pole is a length of light tubing or heavy curtain rod with a hole drilled in each end. Long S-hooks, bent from coathanger wire, have one end fitted in the holes in the pole and the other end slipped into holes drilled in the top edge of a doorframe, as shown in Fig. 2.

Bathroom Drying Rack

When hand laundry is done in a bathroom washbasin, a convenient self-storing" drying rack can be located above or
near the basin if the side of a cabinet or a
closet wall is near the basin. As indicated
in Fig. 3, the telescoping rack is a length
of tubing or pipe which slides inside a pipe
of larger diameter. The latter is screwed
into a pipe flange that is screwed to the
cabinet or wall. Because pipe threads are
tapered, it will be necessary to retap the
threads in the flange from the flat side if
the flange is used as shown in the detail.



Portable clothes pole hangs from doorframe and saves steps when freshly ironed clothes, such as shirts, must be hung on clothes hangers as shown

When the rack is mounted on a cabinet the larger pipe should be located close to the underside of a shelf so it does not interfere with items on the shelf below. If the pipe is run through a closet wall it should be located so as not to interfere with the clothing, or may be positioned so it can be used as a clothes pole in the closet.

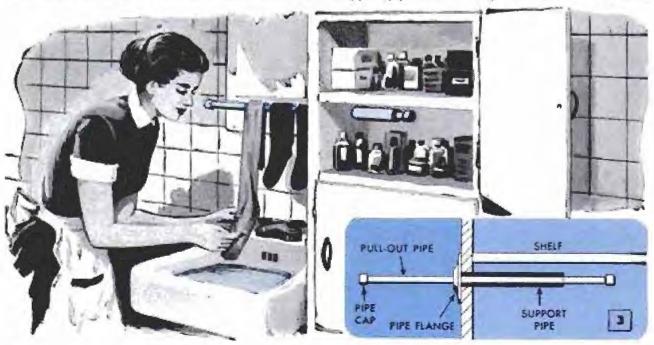
Bedclothes Storage

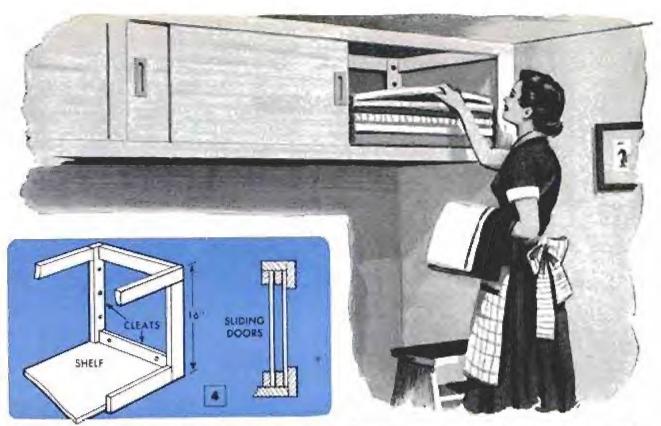
Storage for bed linens and blankets can be provided in a bedroom without using any floor space by installing a shell-type cabinet between a wall and the ceiling. The ceiling forms the cabinet top, one wall is the back and adjacent walls can form the cabinet ends. Hardboard doors can be hinged at the top to swing up against the ceiling, but a neater, more convenient closing can be had by making sliding doors as detailed in Fig. 4. Slides are simply wooden strips nailed to the inside edges of the cabinet framing. A trim strip across the front provides a finished appearance.

More Closet Space

Closets are another area where proper arrangement will add many cubic feet of storage space. Dustfree storage for hats and gloves can be provided by installing lightweight aluminum drawers on the bottom of an existing shelf, Fig. 5. Each drawer consists of an aluminum pan—its size is determined by the space available—to which are bolted lengths of aluminum angle as indicated in the left-hand detail. Slides for the drawers are made by screwing strips of wood and aluminum to the underside of the shelf as shown. Inexpensive cabinet

Clothes-drying rack in bathroom is self-storing, consisting of pipe or tubing that telescopes into support pipe held in flange screwed to cabinet side





Storage for bed linens and blankets is provided by shell-type cabinet located between wall and ceiling

handles can be used for drawer handles. Overhead shoe storage in the closet is arranged by installing a shelf cut from a length of 1 x 4 across the doorframe high enough to provide head clearance, as shown in the right-hand detail in Fig. 5. A "tree" is provided for each shoe by bending a length of coat-hanger wire in a U-shape to the dimensions shown in the detail. Each tree then is fitted in holes drilled in the shelf.

Storage Under Refrigerator

If a refrigerator is the small, apartment

size it often can be placed on a platform, Fig. 6, so that space below the platform can be used for storage. This type refrigerator usually is low enough so that raising it about a foot does not locate its shelves too high for easy reach. The platform on which the refrigerator is placed has three closed sides and can be made of 1-in. lumber, well braced, or from a strong packing case that has one end removed. For convenient access to the space beneath the platform, a drawer, fitted with casters, is made. Again, a packing case could be used. A sheet of plywood is fastened to the

Closet space is fully utilized by installing drawer for hat and glove storage and overhead rack for shoes

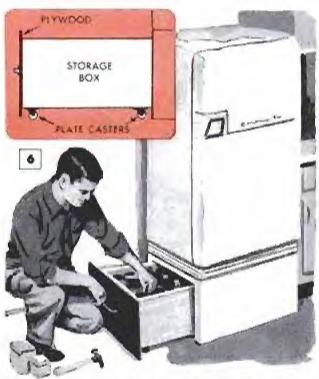


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outer end of the box to provide a neat appearance and a cabinet or drawer pull is screwed to the plywood. The drawer below the refrigerator is an ideal location for household tools, shoe polish and other miscellaneous items that are used only occasionally.

Shell-Type Base Cabinets

Shell-type cabinet construction also can be used for base cabinets. A sheet of ½ or ¾-in. plywood is used for the top and is



Drawer under raised refrigerator is ideal storage place for tools, shoe polish and miscellaneous items

supported on a 1 x 2 frame covered with hardboard. To assure that the top is well supported, screw the upper cross pieces of the cabinet to the wall in several places. If necessary, fit a vertical frame member from the floor to the top frame member at the back and sides of the cabinet to assure that the top is solid. Base cabinets located in such places as between a range and wall or between a range and an existing cabinet require only a top and door, since wall and range form the cabinet back and sides in one case, and the range, base cabinet and wall form the back and sides in the other. When building base cabinets, provide a toe space.

Punching Heavy Fabric

Numerous holes for eyelets can be punched more rapidly in heavy fabric when a piece of rubber inner tube is first placed beneath the material. Less effort is needed to drive the punch, and the rubber surface automatically ejects it from each hole.

St. Clair Rodriguez, Baton Rouge, La.

Corkscrew End on Wire "Fork" Secures Wieners



When making forks from lengths of wire for roasting wieners or toasting marshmallows over an open fire, twist the end of each fork in the shape of a corkscrew. This will hold the food more securely and prevent it from being accidentally dislodged and dropped into the coals or sand. A length of friction tape wrapped around each fork handle will protect the hands and provide a better grip.

G. E. Hendrickson, Argyle, Wis.

Muffin Pan Used as Drawer To Store Small Parts

One homeowner converted this muffin pan into a handy workbench drawer, which provides individual receptacles for nails, screws, tacks, and other small parts used around the house. The lips of the pan ride on L-shaped runners fastened to the underside of the bench top with screws.

Frank A. Javor, North Bergen, N. J.

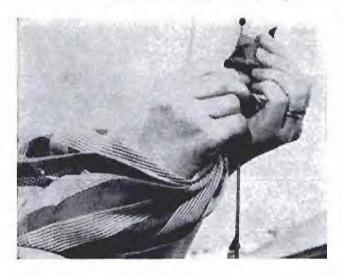


POPULAR MECHANICS

Guard Fence Placed in Window Prevents Child from Falling

An effective guard for preventing a child from falling out of an open window is easily made from wood strips bolted together as shown. Length of the cross pieces should be 1/4 in. less than the width of the window sash and then spaced 7 in. apart. Nuts and bolts should be countersunk flush with the wood surface, and the ends of the cross pieces rounded with sandpaper to prevent binding in the window frame. In most cases, the weight of the window is sufficient to hold the fence in place. However, screw hooks and eyes may be installed on the outside to prevent older children from pulling the guard out. To place the fence in the window first raise the lower sash, then pivot the horizontal bars of the guard up at an angle, slip the lower end in between the stop strips, drop the other end in place and pull the sash down on it. Give the fence a finish to match the sash.

Paul W. Patton, Chillicothe, Ohio



Tape Tearproofs Sandpaper

When it is necessary to use narrow strips of sandpaper on turnings and other small, curved surfaces, the abrasive can be made tearproof by applying a cellophane-tape backing to it. The tape should be applied to the sandpaper before it is cut to prevent overlapping of the adhesive, which might interfere with sanding.

Frank A. Javor, North Bergen, N. J.

Rubber Stoppers Serve as Feet For Tubular-Steel Furniture

Solid-rubber stoppers are excellent nonskid replacements for plastic feet on legs of tubular-steel furniture. The stoppers should be tapered to fit snugly inside the leg, and may be cut to have a flange at the bottom to cover the outer edges.

Charles H. Coleman, Aurora, Ill.



Auto-Caravan Lead Car Identified by Pennant

It is easy to keep a car caravan together while driving in heavy traffic if a pennant is tied to the raised aerial of the lead car. Any brightly colored scarf, piece of cloth or a red handkerchief will serve the purpose. Left on the aerial after arrival at the picnic or other such gathering where the grounds are large, the pennant offers latecomers a means of locating their group. Knot the pennant securely to the aerial to prevent it from blowing off when driving fast. If there is no ornamental knob on top of the shaft, tape the pennant in place.





You'll Have Fun on WATER SKIS

By Ralph S. Wilkes



So say the experts. After you've held that tow rope just once you'll understand what they mean

SUN ON OPEN WATER, a fast boat and flying spray, these are exhilarations that combine into one big thrill in water skiing. In its several forms from aquaplaning to shoe skiing, it's rated the top water sport for all good swimmers. If you can't swim don't apply until you've learned to handle yourself in the water, or be content to wear a life jacket.

If you can ride a bicycle you usually can handle an aquaplane on the first try, but you might find the going a bit wobbly on shoe skis behind a boat doing 25 miles per hour, which is average shoe-ski speed. Aquaplane speeds range from 10 miles per hour up, so if you're a beginner start with the aquaplane. And if you think an aquaplane ride can be little more than a float trip, take a look at the photo above.

Experts differentiate, and rightly, between aquaplaning and freeboarding and the other forms of the sport in which various types of skis are used, But all forms of the sport require development of skill and coordination and a fairly delicate sense of balance. The aquaplane, freeboard and saucer, Figs. 1 and 2, require similar techniques when starting and planing either in deep or shallow water, but the skis, Figs. 3 to 6 inclusive, call for higher boat speeds and different handling. Details A to D inclusive, at the left, show the procedure in starting a run on water skis in fairly deep water. At the start you assume the position shown in detail A, with the tips of the skis out of the water. From this

Water skiers usually take off on regular water skis in the manner shown in the four steps A, B, C and D inclusive, pictured at left. Deep-water start begins in a crouching position, A, and ends in standing position, D, with knees slightly flexed

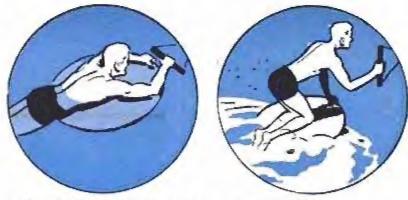


position through B, C and D you simply hang onto the tow rope, let the boat pull you to the standing position and away you go. From there on you either spend your time skiing, or swimming until the boat driver comes about and picks you up. But if you've had a few practice runs on the aquaplane, freeboard or saucer you will have gotten the hang of it and the chances are you'll do all right.

Details at the right show the usual practice when starting with either the freeboard or saucer. Start in the prone position, first step, one hand holding the tow rope, the other gripping the leading edge of the saucer. As the boat speed increases, come up on your knees as in the second step, then up on one knee, third step, with the left hand still gripping the edge of the saucer. Now comes the critical fourth step where you rise to the standing position. The trick is to come first to a crouching position with both feet planted firmly on the board, then let go of the saucer and rise to the standing position in an easy motion. Much the same technique is used in taking off with the freeboard, although some skilled freeboarders take off standing. Take-off is simplified with the aquaplane as you have the hand rope, which gives somewhat surer control, Fig. 1.

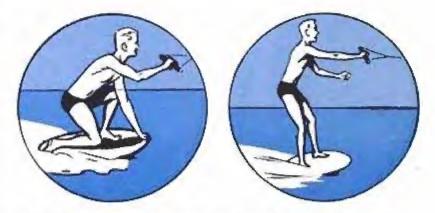
After you've mastered aquaplaning, freeboarding and saucering you'll want to try slalom skiing. In this sport you can start, as with regular water skis, as in the steps pictured on the opposite page or you can start from a boat dock as in the three steps illustrated at the top of page 160. Starting by either method, you discard one ski after you get going. See the center illustration at the top of page 160, also the photo at the right. Also note that the slalom skier in the photo is using a single tow rig, whereas the double, or two-handed, tow rig is generally recommended, Fig. 7. It gives somewhat surer control, especially for beginning slalom skiers. After some practice the slalom skier will be able to start with only one ski and it is then that the double tow rig is the greatest aid to balance. It also helps when pulling in for strarp turns on a slalom course, Fig. 8.

Shoe skis are the next thing to



HOW TO GET UP ON A FREEBOARD OR "FLYING SAUCER"

First two steps in saucer take-off (freeboarders often take off standing) are from prone to kneeling position as in two views above. Note that in both steps left hand holds edge of saucer

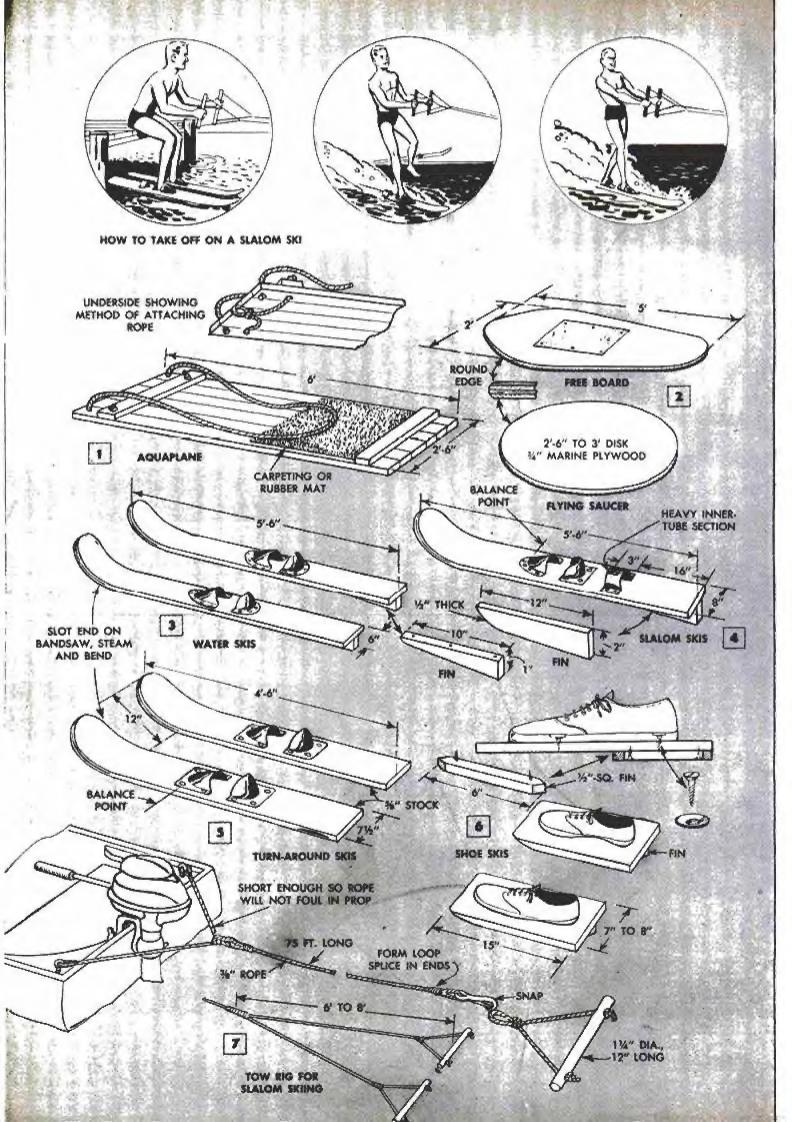


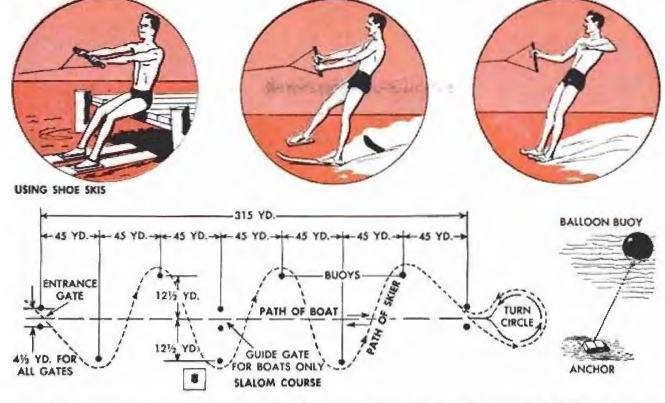
Still holding edge of the saucer the rider places one foot on the disk, then comes up to standing position and away he goes

Try statom skiing only after you've mostered regular water skis.

Advanced statomers make high-speed runs on marked courses







Detail shows a statom course marked by balloon buoys. Note how skier's path crosses that of the towing boat

barefoot skiing and, if you feel venturesome enough to try them, Fig. 6 shows how they are made by attaching a pair of rubber-soled sneakers to two boards, or "shoes," of the dimensions given. The three illustrations in Fig. 8 show how you take off from a boat dock, standing on regular water skis, which you discard one at a time, and then continue the run on the shoes. Note that the water skis, slalom ski and shoe skis have fins, the slalom ski being slightly wider and having a larger fin to give greater stability. Bindings on the water skis, slalom skis and turn-around skis can be cut from a heavy truck inner tube and attached to the skis with cement reinforced with screws and washers, or you can purchase ready-made bindings at a nominal cost. Note that the slalom ski has a special toe binding for that other foot.

Turn-around skis take some learning. Even good skiers find them tricky, Although Fig. 5 shows them turned up only at one end, some skiers will prefer to have them turned up equally at both ends. The turn-around skier starts the run facing forward as with the conventional water skis. After he is well into the run (about 20 miles per hour) he drops to the crouching position and turns, facing backward. It's a neat trick if you can do it without a spill. Some water skiers face backward at the start by reversing the bindings on regular water skis so that they can face backward with the turned-up ends of the skis facing forward, that is, toward the towing boat. They then maintain this backward position throughout the run.

All types of skis, Figs. 3, 4 and 5, can be made from selected pine or poplar, straight-grained stock % in. thick being about the right weight. The ends to be curved are slotted on the bandsaw for a distance of 10 to 12 in. and the slotted ends are steamed and bent over a wooden form, clamping in place until dry. Then remove from the form, spread the saw kerf slightly and apply waterproof glue between the plies. Replace in the form and clamp until the glue dries. Again remove from the form and fill the slight crack at the end of the bandsaw kerf with boat-calking compound. Next, round

Freeboarders like easy swing of long freeboard runs on smooth water. It's a genuinely satisfying sport



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EXECUTING TURN-AROUND







Turn-arounds are done in four steps beginning with position shown at upper left. Difficult stage of maneuver is to keep the trailing ends of skis from digging in as you come around

Water shoes are just one step from skiing on your bare feet, and that also is done by professionals and skilled amateurs

all corners with sandpaper, apply a sealer and follow with two coats of marine enamel in the color desired. Sand lightly between coats and rub down the last coat with fine steel wool to give a perfectly smooth surface, especially on the bottom of each ski.

The aquaplane, Fig. 1, consists of several 6-ft. lengths of stock glued and cleated together. The surfaces should be thoroughly sanded, especially the bottom surface, before finishing with sealer and enamel. You also can make a more professional aquaplane with a rounded forward end by using ¾-in. marine plywood. Sand the edges smooth, fill any openings in the core stock with boat-calking compound, and finish with marine enamel. Or, if you use mahogany-faced plywood, finish with two or more coats of spar varnish, sanding lightly between coats and rubbing down the last coat with fine steel wool. Much the

same construction and finishing procedure applies to the freeboard and saucer, these being made of plywood, of course. Note especially the shape of the freeboard, which is pear-shaped with an extreme width of 2 ft.

For towing, use about 75 ft. of %-in. rope. Fig. 7 shows one way of attaching to the boat. The yoke should be short enough so that the rope cannot foul the prop when it goes slack. If the tow rope is to be used for both aquaplaning and skiing, loop-splice a snap at the outer end so that the change from aquaplane tow to ski tow can be made quickly.

Don't try aquaplaning, freeboarding, saucering or skiing in unknown waters and, unless you're exceptionally skilled, don't engage in these sports when the wind is strong enough to kick up a rough chop in fresh water or even a moderate swell in salt water.

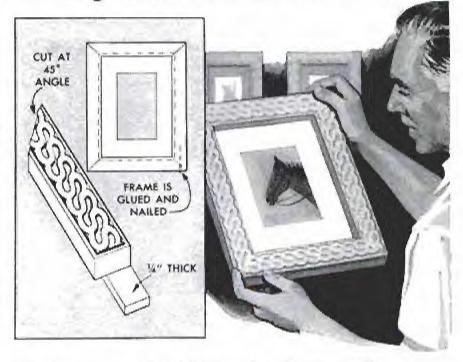
Toy Dishes Make Meals Fun for Sick Child in Bed

Toy dishes are ideal for serving meals to a sick child when he must remain in bed. Illness reduces appetite and the smaller portions held by the toy dishes often are generous enough to satisfy the child. Food served in this way seems more like a game than a meal and the child will be intrigued and eat more food than he might otherwise. The small dishes aid mother too, since she can serve the whole meal on a small tray

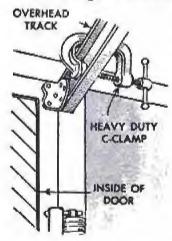
that can be held on the child's lap. When serving food to adults who are ill, the toy dishes also can be useful. The tiny sugar and creamer contain enough for an individual serving and samples of food that the patient would like to taste can be served on the toy plates with a minimum of waste. Attractive to the sick person, the colorful dishes also make serving more interesting.

Fancy Picture-Frame Molding From Embossed-Leather Belt .

An embossed-leather belt that is no longer wearable can be used to make fancy picture-frame molding as shown. Glue the material to wooden strips of the same width and attach a narrower 1/4in.-thick strip on the back surface to retain the enclosed picture. Then cut the stock to form the four sides of the frame, mitering the corners together using glue and small brads. The entire frame may then be finished with bronze or silver paint, especially if the embossing is worn and discolored too much to be polished.



Overhead Garage Door Locked With Large C-Clamp



An overhead garage door that has no lock built into it can be locked if a large C-clamp is tightened at the door end of the heavy overhead track. When the clamp is in place, it is impossible to open the door from the outside.—Rex Eidson, Portland, Ore.

Painted Cottage-Cheese Boxes Are Colorful Flowerpots

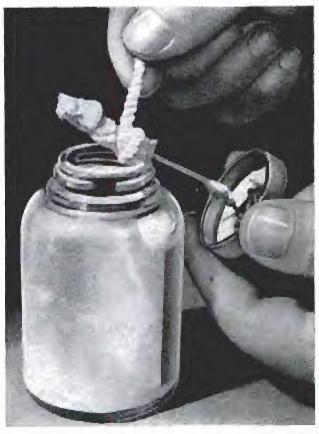
Cottage-cheese containers are attractive flowerpots, when painted a bright color and the lids used as saucers. After the containers and tops have been washed and allowed to dry, apply one coat of enamel in the color desired and pierce a small hole in the bottom of each container for drainage. Small decals can be applied on the sides of the containers and on the lids, for added color. Some salad and ice cream containers also can be used for this purpose.

Kathryn M. Wilson, Pontiac, Mich.

¶Ladders should be given a transparent finish of wood preservative or exterior varnish so that cracks and weak sections in the wood, which may lead to breaks, may be seen.

Liquid-Glue Applicator Enlarged By Winding Pipe Cleaner on It

When the applicator attached to the cap of a liquid-glue bottle is too small for practical use, failing to hold enough glue, increase its size with pipe cleaners. Wrap the cleaners around the applicator stem, as shown, to the desired thickness and the glue will hold them in place. When the pipecleaner wrapping becomes hardened replace it with a fresh one.



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Easy-to-Build GLASS-FIBER POND

By Boris Volg

NO OTHER FEATURE will add as much natural beauty to your landscaping as a pond, stocked with fish and planted with water lilies and other aquatic plants. Such a pond now can be built in a short time, without heavy labor, and with no tools except a shovel, broom, paintbrush and tin snips. Glass-fiber cloth and polyester resins are the building materials required.

First, dig a shallow excavation the size and shape desired, then wet the dirt and "trowel" it with a broom so it is fairly smooth. Next, lay the cloth in place in the

After hole has been excavated and wet sail smoothed with broom, cut glass-fiber cloth to fit in pond

Trim dried cloth with tin snips, paint edge with resin to eliminate sharp edges. Patch all holes





excavation, lapping it over the top edge a couple of inches. Lap all joints 2 in. Mix the resin according to the manufacturer's directions and apply it to the cloth with the paintbrush. Holes and tears in the cloth can be patched with a piece of the cloth and resin. Allow the cloth to dry, then trim the top edge with the tin snips. Paint the cut edge with resin and smooth it over to eliminate any sharp edges.

Because the glass-fiber-resin combination is inert, fish and plants can be placed in the pond as soon as it is filled with water.



Use paintbrush and saturate cloth with resin. Patch holes with cloth and resin, allow to dry completely

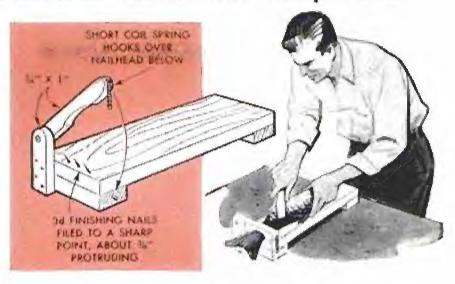
Ignore sand or dirt stuck in resin, fill pond with water, drop in fish, add flowers and job is done



POPULAR MECHANICS

Fish-Cleaning Job Is Easier and Faster With Clamp Board

Half the job of scaling and cleaning the fish you catch is in keeping them from slipping out of your grip. The clamp board shown at right solves this problem by effectively holding the fish while you use both hands to do the cleaning. The pivoting clamp bar presses the tail of the fish against nail points which grip the fish. The bar is held down by a stiff coil spring that adjusts to the thickness of the tail.



Sprinkler Rate of Flow Measured In Empty Coffee Can



To decide when enough water has been sprinkled on plantings for the recommended 2-in. depth-of-soil soak is difficult, unless some means of measuring the rate of deposit of water on the surface of the ground is devised. One gardener solved this

problem by setting an empty coffee can in the medium range of his sprinkler. The time required to fill the can with 3 in. of water is the equivalent sprinkling time needed to soak the soil to a depth of 2 in.

Extra Handle on Garbage-Can Lid Permits Easier Removal



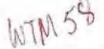
Women who find it difficult to remove the lid from a garbage can will welcome an extra handle attached near the edge of the lid as shown, permitting pulling force to be applied where it is needed. This entails less exertion than pulling the lid up with the center handle.

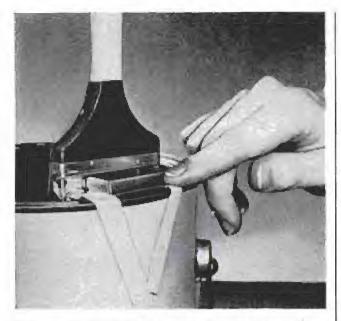
The extra handle is attached with small bolts, washers and nuts. A single strip of flat metal replacing the two washers on the inside will give greater rigidity.

Handy Wall Rack for Magazines

Two 16-in.-square panels of perforated hardboard spaced by wedge-shaped wooden ends comprise this handy wall rack for holding magazines. The panels are fastened to the side wedges with ¾-in. wood screws. The back panel is installed an inch above the tops of the end pieces allowing for a cleanout groove below, and hangs neatly on the wall from right-angle curtain hooks, A wire rack, designed for "Peg-Board" use, can be attached through the holes on the front panel to hold smaller magazines and pamphlets. For a larger wall rack simply fasten longer panels of 16-in.-wide perforated hardboard on the side wedges.







Magnet Holds Brush Upright In Paint Can

When interruptions make it necessary to set your paintbrush aside for a moment, a magnetic door latch taped to the rim of the paint can will hold the brush upright with the bristles in the paint. With this provision the paint will not dry on the bristles and there is no chance for it to run on the heel or handle of the brush, as often happens when the latter is laid on its side.

Name Written With Sparkler Photographed By Time Exposure

Names written in the air with Fourth-of-July sparklers are photographed by one camera fan. The camera is set on a tripod to assure steadiness and the shutter set for time exposure. The lens is stopped down to f:16. Focus is accurately measured from camera to sparkler. To be sure of an underexposed background that will print black,



the photographs are taken on a moonless night with no lights. As soon as the sparkler is lighted, the camera shutter is opened. The sparkler is used as though it were a piece of chalk being used to write the name in large letters on a blackboard. After the film is developed, the negative is printed in reverse so the name reads correctly.—Don Honick, Chicago.

CHINESE-OVEN BARBECUE

By Brewster Morgan

(Courtesy of Arizona Highways Magazine)

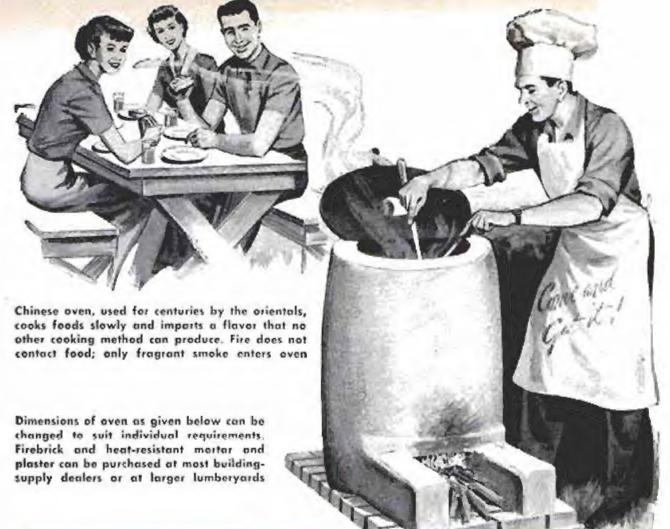
CALLED A CHINESE OVEN, the barrelshaped barbecue pit illustrated on the facing page cooks foods slowly and smokes them, a process that imparts a flavor duplicated by no other method. An advantage of smoking is that meats, fish and vegetables can be cooked together without in-

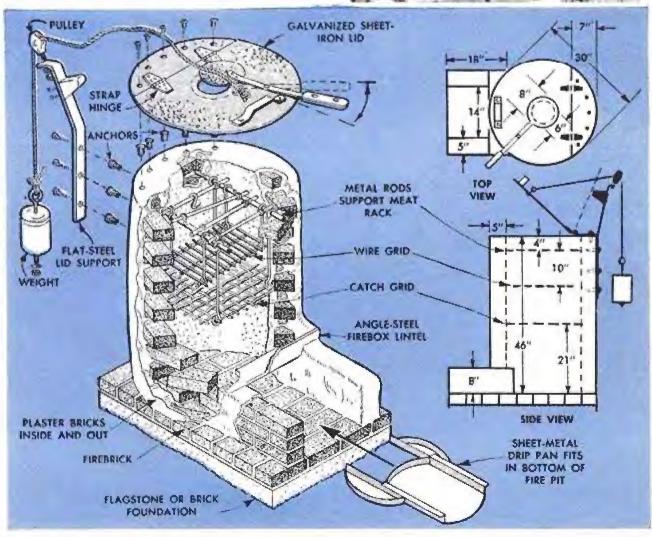
terchange of flavors.

The oven can be built as easily as most barbecue pits, and usually requires less space. Oven dimensions are only suggested, since its size would depend on the amount of food that will be smoked. Flagstone, brick or poured concrete can be used for the foundation. Heat-resistant mortar then is used to set a layer of firebricks on the foundation for the oven floor. About three courses up, the angle-steel lintel is fitted over the firebox opening. Two metal rods, which support the meat racks, are mortared in place about three courses from the oven top. If the oven is not as barrelshaped as you wish, this can be corrected by doing some "sculpting" with the fireresistant plaster troweled over the inside and outside of the oven. When applying the plaster, insert screw anchors to provide a means of attaching the lid and its flat-steel support. Trowel the top of the barrel flat as shown in the side view.

The support is a length of flat steel bent at its top end and fitted with a pulley over which is run the cord holding the lid counterbalance. A wooden block on the support acts as a lid stop. Sheet metal is used for the lid which is hinged as indicated. A 6-in hole in the lid center provides draft, and is covered by an 8-in. disk fitted with a handle that is pivoted to the lid. This is the adjustable damper. The meat rack consists of sharpened hooks bent from heavy wire and slipped over metal rods that lay in notches filed in the support rods. Vegetables, hot dogs and the like are smoked on the wire grid suspended from the support rods on wires. Heavy screen wire is used for the catch grid which is designed to catch any food falling from above. Sheet metal is used to form the three-piece drip pan located in the bottom of the oven.

Firewood should be of a type that makes fragrant smoke, such as hickory. Build the fire in the firebox outside the oven. Allow plenty of cooking time, since smoking takes longer than other methods.





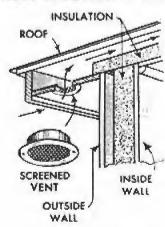
Trash Box Fastened to Mower Saves Steps When Cutting Lawn



Loose Wires in Circuit Breaker Cause Unnecessary Opening

If the circuit breaker in the line cord on your washing machine or other appliance opens frequently when there is no apparent cause, the trouble may be due to loose connections in the plug. Remove the cover from the plug and tighten the screws that hold the wires in place. The latter may have worked loose, causing sufficient current resistance to open the breaker.

Roof Insulation Ventilated



When roof rafters also serve as ceiling joists for the rooms below, spaces between the joists adjacent to the insulated ceiling can be ventilated by installing screened vents in the eaves or roof overhang. One or two vents should be located at the ends of each joist

space. As a substitute for the vents, the eaves can be provided with a continuous screen-covered slot about 1 in, wide.

Minimize the adhesion of dust to newly varnished work by suspending it upside down with string or rope until dry. Dust will not collect on the lower surfaces and vertical sides which will later be exposed to view.

A wooden box bolted or wired to the lawn-mower handle becomes a very useful container for trash picked up in the process of mowing a lawn. Twigs, stones, paper and bones can be deposited in the box saving frequent trips to the trash can. When the mower is not in use, gas, oil and adjustment tools may be stored in the container.

R. S. Howard, Milton, Wis.

Striped Sleeve on Guy Wire Provides Safety Factor

A utility-pole guy wire that is located so it presents a hazard to motorists and pedestrians can be made more conspicuous by covering it with a striped sleeve. The sleeve is a length of garden hose slit to fit over the wire. Coat with reflective-type paint.



Cut Plants Kept Fresh Longer By Crushing Ends of Stems

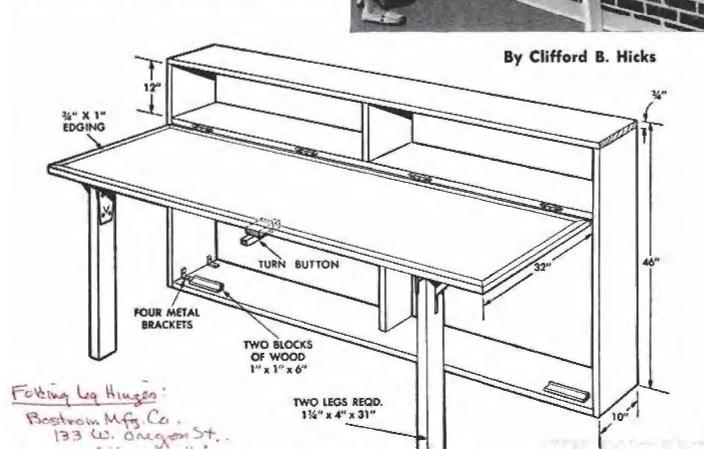
Woody-stemmed plants which seem to wilt quickly when cut for an indoor bouquet can be kept fresh for a longer time by crushing the lower few inches of the stems with a hammer. The broken fibers of the stems present a greater area of absorption, thus carry more wilt-preventing water to the blooms.



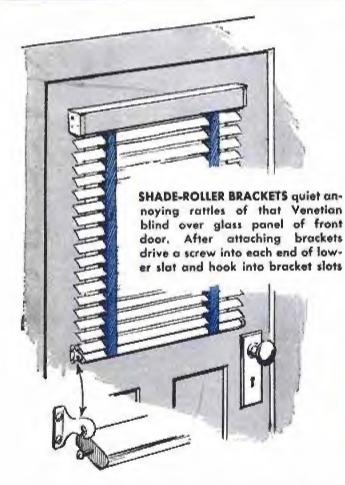


Outdoor Table

Eating outside is a real pleasure with this attractive and convenient table on which to serve meals. Attached to wall of house in screened patio, the table folds into decorative piece of furniture when not in use. Ordinary lumber free of knots can be used for all wooden parts but plywood table top. Dimensions given can be modified to suit individual space and seating requirements. Use plastic laminate to cover table, and protect edges with metal molding



Home Problems





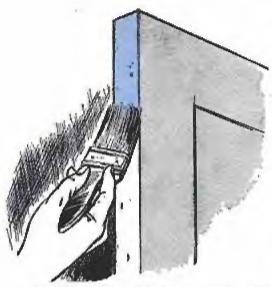


TEA STRAINERS hinged together as pictured, using a short length of brass wire, make a handy sudser when filled with soap flakes or "shavings" from a bar of laundry soap. Takes only a few seconds to raise a heavy suds in the dishpan or washing machine

WOODEN DRAWERS that are heavily loaded can be made to slide easily by "lubricating" lower edges of sides with a bar of laundry soap or a cake of paroffin. Just rub lower edge of drawer side with a corner of the cake, or bar, in the manner pictured



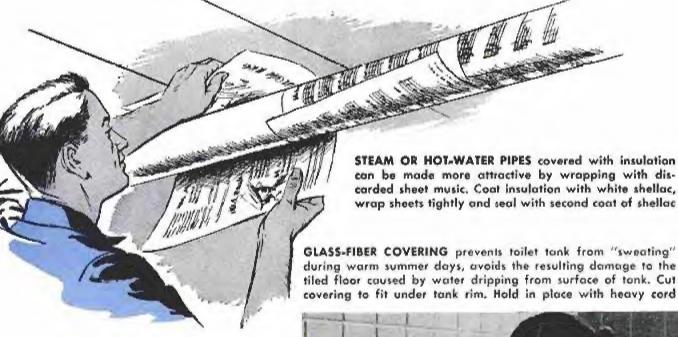




DOORS sometimes stick due to accumulated coats of paint on edges. Remove old finish to bare wood with a nonflammable remover and refinish with one new coat of paint



SHEET OF CLEAR PLASTIC holds that unruly recipe booklet flat so you can read it easily even while mixing ingredients. A rectangular piece of plastic ½ in, thick does the job nicely, even holds a heavy cookbook open to the desired page number



STRIP OF ADHESIVE TAPE pressed tightly over center terminal of flashlight battery prevents excessive drain should the terminal come in contact with any metallic object while battery is stored. Crossed strips of tape are even more effective





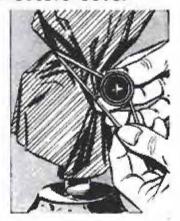


Uses for Aluminum-Foil Piepans

Small aluminum piepans, purchased with frozen pies and meals, can be utilized in many ways around the home. Besides making bright waterproof coasters for flower vases, potted plants, or beverage glasses, they can be inverted and molded into lids for small bowls, jars, cups and tumblers. They make fine emergency ash trays too, and can be folded together and discarded with the ashes still inside. When filled with water, the pans can be used to soak and remove stamps from envelopes. Several pans kept in the shop are handy for sorting small parts. One can easily be bent into a spout for pouring tacks and other small items back into their containers. In the garden, tie them to fruit trees to scare birds.

Band and Button Secure Cover

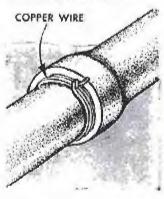
A large button sewed to a rubber band is ideal for securing bag-shaped equipment covers in a hurry. After the cover is placed over the equipment the rubber band is stretched around the open end and "buttoned" as shown. Coarse



thread should be used for fastening the button to the band to prevent it from cutting into the rubber. To keep the band handy, stitch one end of it to the cover.

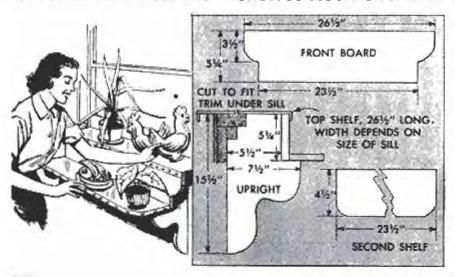
Copper Wire Wound on Sewer Tile Keeps Tree Roots Out of Joints

Bare copper wire wound around sewer tile at each joint will help to prevent small roots from entering and eventually blocking the tile since roots that come in contact with the copper will be killed. Even if the sewer



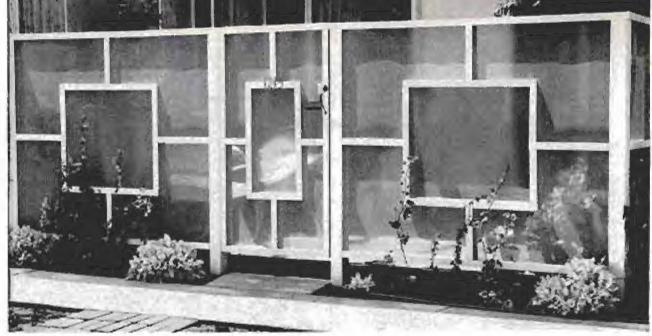
line should settle so that joints are no longer sealed the copper windings will protect the openings. Open-tile septic systems can be similarly protected with copper wire wound on both ends of each tile. Roots are attracted to the sewers to procure moisture, but the copper kills the fine roots before larger ones can become established.

Ornamental House-Plant Shelves Hook Over Window Sill



Additional space for your favorite house plants is provided by installing detachable shelves which hang over the window sills as shown at left. The top shelf is a piece of 1/2in.-thick sheet metal 261/2 in. long with a %-in. lip along both of the side edges. The inside edge is attached to the front board with brass upholstery tacks, also used on the lower shelf.-Robert Dalton, Roseville, Mich.

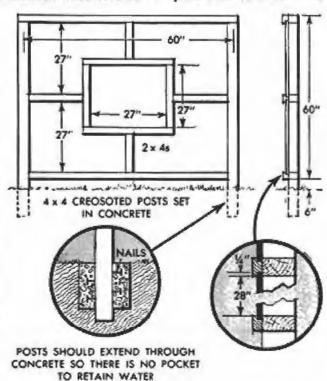




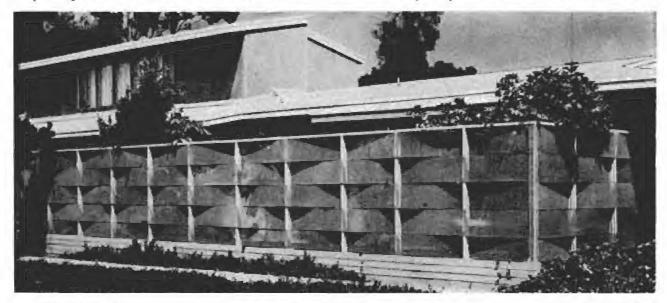
Framework of modern design makes attractive patio wind screen when covered with plastic-coated screen wire

PLASTIC WIND SCREENS

PLASTIC-COATED SCREEN WIRE, such as Screen Glass, has been found excellent for making attractive low-cost wind screens. The material is relatively inexpensive, offers a degree of privacy and is fairly durable. It is applied and stretched like screen wire, tacking the plastic-coated material to a post-supported framework and covering the tacks with screen molding. While not as durable as translucent glass fiber, the low cost of the plastic-coated material makes it feasible to replace it periodically like the wire on window screens. Strips 12 to 14 in. wide interlaced over posts set 3 ft. apart produce the attractive basket-weave screen pictured below. The right-hand detail shows how rabbeted strips are used to conceal the edges when translucent glass fiber is used to cover a screen.-Hi Sibley, Nuevo, Calif.



Strips of plastic-coated screen wire interlaced and tacked to 4 x 4 posts produce basket-weave screen below



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Above, marine varnish applied before and after the design is applied protects skis from water damage



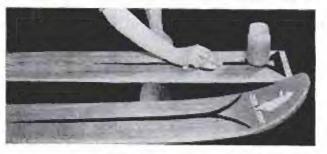
A touch of originality is illustrated above in the "brand" designs being painted on the toe of each ski. Masking tope is used to outline the design

The design is complemented, below, with stripes of contrasting color running the length of the skis



E ASY-TO-FINISH water-ski kits are now available to the home craftsman. and at a saving in cost when compared to the price of a finished pair of skis. The kits come complete with two steam-bent pieces of ash wood, keel strips, precut foot harness and all necessary hardware. In finishing, it is advisable to first bevel the upper edges of the skis, then sand them smooth for a fast low-friction surface. A ball of putty or a rubber sanding block should be used when sanding the curved toes to prevent gouging into the wood. Light staining will then bring out the grain, after which a coat of good marine varnish is applied. Keel strips are attached with the tapered ends forward and foot harness installed in predrilled holes. A design may be painted on the skis as shown.

Below, rubbing compound is used to produce a luster on the finish. A satin effect is created by sanding with extra-fine waterproof sandpaper and water. An application of waterproof wax will protect the finish and minimize water friction



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POPULAR MECHANICS



Top edges are beveled, and the entire surface sanded with waterproof sandpaper dipped in water



Keel strips, above, are mounted on the bottom of the skis at the rear, each one approximately 1 in. in from the side and rear edges. Place the tapered ends of the keel strips toward the front end of the skis

Right, your youngster will be proud, too, after he makes his own personalized set of water skis. And just think of the water fun he'll have this summer

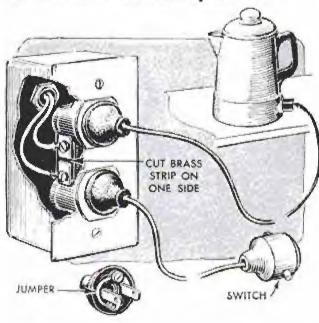
Below, toe harness is attached to the skis with wood screws 2½ in. ahead of the holes predrilled for the heel harness. Bolts are pushed up through the holes and the adjustable heel harness attached





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Two-Plug Wall Receptacle Adapted For Remote-Control Operation



Cutting one of the brass tap strips on a two-plug electrical wall receptacle permits remote-control operation of an electrical device plugged into one of the outlets. When mounting in a receptacle box connect the line service leads to the two screws of the severed tap strip as indicated in the illustration. The remote-control switch is made from a feed-through pendulum-type light switch, which is connected to a length of cord equipped with a male plug at the opposite end. Insert the remote-control unit into one of the outlets and the appliance into the other. For normal use of the receptacle replace the remote-control unit with a male plug having a jumper wire between the prongs.

Thomas Fagan, North Bessemer, Pa.

Measurements Recorded on Ruler

When taking measurements, errors are less likely to happen if you write the measurements down on a strip of waterproof adhesive tape which has been attached to the ruler or yardstick. When no longer needed, the figures can be easily erased and the tape reused.





Air forced into attic by exhaust fan is discharged through vents cut in underside of roof overhang

HOUSE COOLED

WHEN an attached garage shares a common attic with a house, as in the examples shown in the photographs at the tops of these pages, the situation is ideal for the installation of an attic exhaust fan in the garage ceiling. The Lau Blower Co., of Dayton, Ohio, has developed such an installation and finds that it eliminates many of the disadvantages present when the fan is installed in the ceiling of a home with a low-pitched roof. First, since the installation is made outside of the living quarters, dirt and dust which result when the fan opening is cut do not cause any inconvenience to the homeowner. Air exhausted into the attic is discharged through louvers fitted in the overhang of the roof. Since the louvers are outside the house, their installation also causes no inconvenience.

If a large fan is located in the ceiling under a low roof, the short distance between fan and roof results in considerable fan noise. When the fan is installed in the garage, it can be located below the ceiling line, which provides more clearance between roof and fan, thus reducing fan noise. And, since the fan is located outside the house, noise of both motor and fan are less apparent inside the house.

When the fan is located in the garage ceiling it can be used to cool the whole house or just to "air wash" the attic. When the house is to be cooled, the outside garage door is closed and the door between the house and garage is opened. Air then flows through the house, into the garage and through the fan into the attic. If the fan is used just to air-wash the attic, the door between the house and garage is closed and the outside garage door is opened. Outside air then is drawn through the fan and out



Common attic shared by house and attached garage, as in house pictured above, presents an ideal situation for locating attic exhaust fan in ceiling of garage, where it is isolated from the main living area

by Fan in Garage

the louvers in the roof overhang. Airwashing the attic in this manner is a definite advantage when air conditioning later is installed in the home. In this particular case it will permit the use of a 3-ton air conditioner, when normally a 5-ton unit

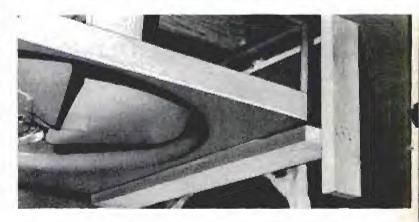
would have been required.

Actual installation of the fan in the garage ceiling is not difficult. First, the opening is cut through the plaster, which is removed. Ceiling joists are not cut. The fan then is mounted on a framework consisting of short lengths of 2 x 4s bolted to the ceiling joists, with crosspieces spiked between them. Canvas strips are fitted between the framework and the fan body, both as sound insulation and to prevent recirculation of air past the fan. An adjustable louver is mounted on the frame under the fan, then the sides of the framework are covered with hardboard.

If an attic exhaust-fan installation, as described, is being considered for your own home, it is advisable to consult local building codes. In some instances fire regulations require the door between the garage and house always to be closed.



Above, fan opening is cut through garage ceiling, leaving joists intact, after which fan-supporting framework is suspended under opening as below. Be sure framework is level so fan is supported solidly to assure that fan and motor will operate quietly



Lower left, finished installation of fan presents neat appearance and provides ample headroom. Timer and control switch are located on wall. Lower right, canvas strips fitted between wooden framework and fan frame prevent recirculation of exhausted air





Inform local police of length of time you plan to be away so they can give special attention to home

Above, take inventory of jewelry and documents, serial numbers from large objects. Store important items in a vault. Below, cover upholstered furniture with cotton sheets to prevent fading, since draperies and blinds should be left in normal position to give impression house is occupied



'VACATIONPROOF' Your Home

YOU'RE ON VACATION and have taken care of the usual things around the house before leaving. But what about the valuables that should have been deposited in a vault, the hot-water heater and refrigerator that could have been turned off to save on the next utility bill, and the call to local police asking them to keep a watchful eye on the house in your absence? These added precautions wisely taken will guarantee a vacation free of worry.



Silverware wrapped in nontarnishing paper, above, will protect it during the period you're away and will save a cleaning job later. Below, move TV set away from window if it is normally placed there. Disconnect outside antenna from back of set and unplug electrical connection from wall receptacle





To prevent accidents or fires resulting from faulty electrical installations turn current off at main switch, unless you want to keep a light burning



If vacation is longer than two weeks, defrost the refrigerator, remove all perishables, pull electrical connection from outlet and leave door open



Above, be sure burners on gas stove are shut off tight. Main gas valve needn't be turned off since pilot light burns small amount of gas. Below, set plants on overturned soup plates in bathtub, with water in tub just up to top of pots and washcloth in water leading to soil to draw water for plants

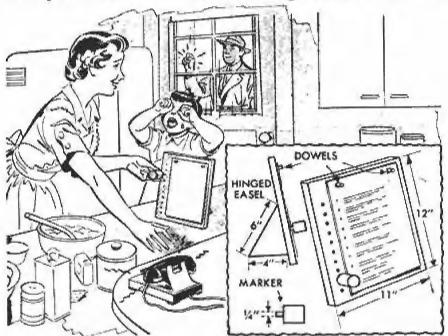


Hot-water heater, above, should be turned off at main heater valve so fuel or electricity is not wasted heating and reheating water that will not be used until you return. Below, hang all woolen clothes in closets, apply liberal amount of a good mothproof product and keep the doors closed





Recipe Board Marks Off Ingredients as They Are Used

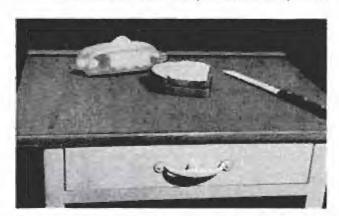


If your attention is diverted or you are called from the kitchen while mixing the ingredients of a recipe, this plywood board will help avoid errors. The recipe is typed or written on punched paper which is then hung from dowel pegs set in the board near the top. The holes along the side for the movable marker are spaced about 1/2 in. apart, The marker itself is a 1in. dowel with a 1/4-in. dowel set into it, and is moved to check off each ingredient as it is used. -W. S. Head, El Cajon, Calif.

Utility Kitchen Table Fitted With Breadboard

Many older kitchens do not have enough counter space for cutting and preparing of food. This lack can be alleviated by removing the top from a wood or metal utility table and replacing it with a cutting block which is bolted to the table through the original screw holes. From underneath, mark these holes on the bottom of the board, and then drill matching holes through it. Countersink the heads of the bolts in the top surface of the board, and cover them with a wooden plug or wood filler. As an added feature, casters may be installed on the legs to make the table easy to roll about.

Edward L. Fisher, Milwaukee, Wis.



Is Your Plumbing Outmoded?

Increased water demands brought on by the addition of modern automatic appliances frequently tax a dated water system beyond its capacity. What you can do to remedy an overburdened system is explained in an August feature

Coasters From Aluminum Foil

Temporary coasters for drinking glasses can be made from aluminum foil when you are giving a party and need a large number of coasters in a hurry. First, draw a circle on a sheet of aluminum foil 1 in. larger than the bottom diameter of the glass on which it is to be used. Then cut the pattern with pinking shears, center the glass on the aluminum foil and turn up the edges against the sides of the glass. Several coasters can be cut out at the same time.

Blanche Campbell, Los Angeles, Calif.

Paper-Plate Spacers Protect Stacked China Dishes

Paper plates used as spacers between stacked china plates protect the glazed surfaces from scratching and rubbing when removing and replacing them on the shelf. The cushioning effect of the paper plates also eliminates much of the handling noise, and the dishes are easily packed for moving with additional protection provided.



Indian Headdress for Youngster Is Made of Feathers and Tape

Your youngster will have many hours of enjoyment wearing an Indian headdress like the one shown. In fact, he can easily assemble the headpiece himself with masking tape and colored feathers. First, cut a piece of tape slightly longer than the circumference of the head and place it, gummed side up, on a table. Then stick the quill ends of the feathers onto the adhesive, cover them with another piece of tape, and tape the assembly together in a circle. Attach feathers to a short piece of tape for a tail.-K. Greif, Vestal, N. Y.



Renovating Old Books, and New Ones Worn From Extensive Use

Books that have become damaged can be restored with a few simple repairs and little effort. All torn pages should be patched with cellulose library tape. Single loose pages should be trimmed and pasted to an adjacent page. If a group of pages is loose sew them together and stitch them to the binding. Several strips of adhesive tape placed across the back will tie a loose binding together. Extend the ends of the tape out ¾ in. and stick it to the covers. Flaking glue on the binding should be removed and a fresh coat applied. Replace worn and torn cover material with a sheet of plastic, extending it around the edge of the covers

and gluing it on the inside. The title from the original covering can be glued to the plastic or fitted into an opening from the back side of the plastic. Loose front and back covers are secured by pasting a 1-in. strip of typing paper between the cover and the first flyleaf as a "hinge." Stiff cardboard attached with adhesive tape, and covered with plastic can be substituted for missing covers. Clothespins are used to hold the plastic in place until the glue dries. By using two or more colors of plastic as a code, volumes are identified quickly.

Zoe A. Tilghman, Oklahoma City, Okla.

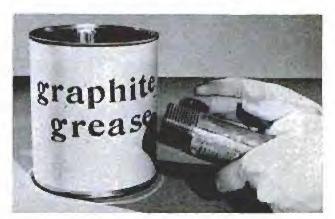
Clipper Rounds Tag Corners

A pocket nail clipper is a handy tool for rounding the corners of cardboard tags and other pieces of thin nonmetallic material to prevent curling of corners and improve their appearance. The clipper can also be used for cutting identifying notches in tags or file cards as a means of coding them for future reference.

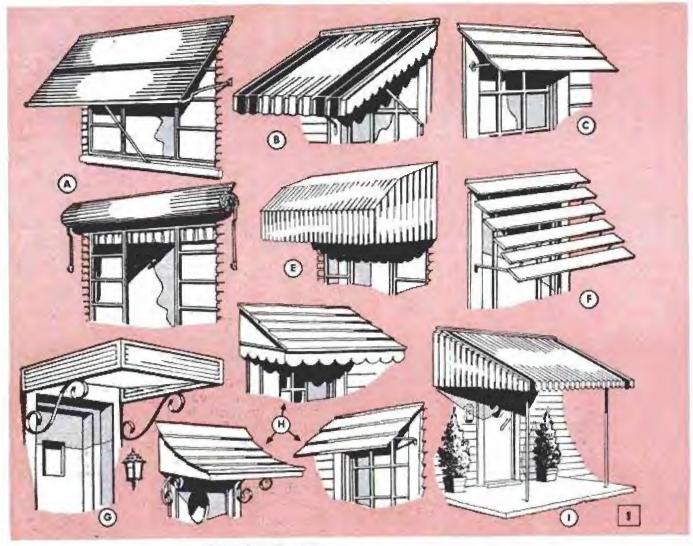


Graphite Grease Protects Standpipe Threads

A small amount of graphite grease applied to the threads of a standpipe used in a basement floor drain or swimming pool will prevent it from "freezing" in the coupling and protect both members from corrosion. When it is necessary to unscrew the standpipe the lubricated threads will permit its removal with less effort.



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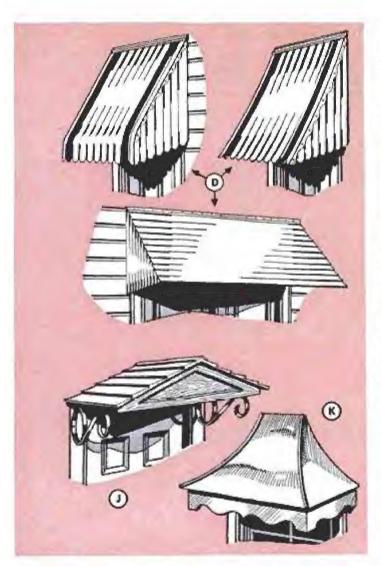
SELECTING THE

By E. R. Haan

A LTHOUGH the main function of window awnings and door canopies is to provide shade and protection against rain and sleet, their design should harmonize with the style of a house. Other important considerations in selecting awnings are: The kind of windows that must be covered, how much shade and rain protection is necessary and how much light and visibility can be sacrificed. Durable, rigid materials now extensively used for the newest types of permanent awnings and canopies include prefinished sheet metal, such as aluminum, and translucent glass fiber which is available in many colors.

Awning Styles

Awnings of the kind shown in detail A, Fig. 1, consist of interlocking, pivoting aluminum slats that allow the awnings to be rolled up out of the way when desired. These awnings need not be removed and stored for the winter months. Detail B





Childers Mfg. Co. photo

RIGHT AWNING OR CANOPY

shows a rigid, sheet-metal awning that can be installed at practically any angle and is therefore convenient for use over casement windows as well as double-hung windows. Small, light-saver awnings, detail C, consist of metal or glass-fiber panels arranged at an angle over a window and held in place by means of small brackets and metal rods. Their particular advantage is that they provide some shade and protection against rain with a minimum sacrifice of light and visibility. Detail D shows three styles of awnings that have enclosed sides. The two having curved tops are made of aluminum, while the third has a straight top and is made of glass fiber. Awnings that have enclosed sides should be provided with adequate means of ventilation to prevent the formation of hot-air pockets and permit better circulation of air through the top of an opened window. A style of awning having enclosed sides, and a top that fits closely over a casement window, is shown in detail E. The awning shown in detail F has wide slats which are separated

to provide more visibility and ventilation.

Types of Door Canopies

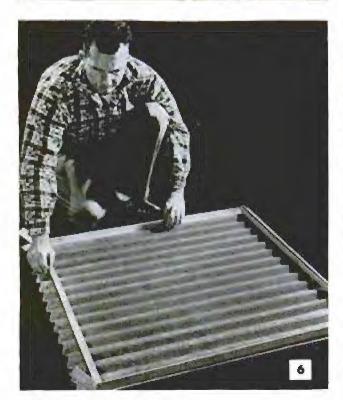
Door canopies not only provide shelter, but also help protect doors against rain. Appropriate for many ranch houses, the canopy in detail G has aluminum sides and front and a roof of glass fiber. While this canopy appears to have a flat roof, it actually fits between the sides, and slopes at a slight angle to shed water. Holes in the front corners of the roof permit the water to drain.

Detail H shows three simple canopies that have sloping roofs. These may consist simply of a small inclined panel with open sides and no front apron. If there are sides and front, these may be plain, scalloped or otherwise shaped. The roof may consist of metal slats arranged horizontally or vertically, or it may consist of a single piece of covering material.

Detail I shows a larger canopy that serves to cover the entire stoop or small porch at an entrance. Because of its size and weight,







it requires supporting columns. Other styles of canopies are the gable-roof type, detail J, and the hip-roof type, detail K. Prefabricated canopies in various sizes such as the one in Fig. 2, come in kit form, enabling homeowners to assemble and install them quickly and easily as shown in Fig. 3.

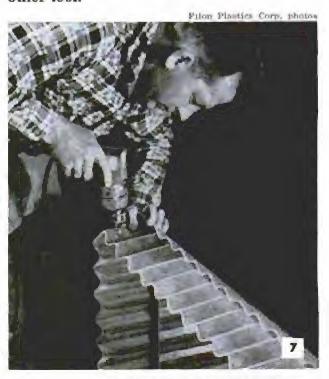
Glass Fiber for Awnings

Glass-fiber panels have numerous advantages for awnings. The material is translucent, extremely durable, comes in many colors and is available in various forms, such as plain, corrugated or step-shape to simulate a shingle roof. It can be sawed, drilled and otherwise worked with hand or machine tools. Awnings with enclosed sides can be made of this material and a frame of aluminum angle, as shown in Figs. 4 to 9.

Making Glass-Fiber Awnings

As shown in Fig. 4, awning dimensions are determined by supporting a straightedge and level outward from the vertical center of the window, while a rule is held diagonally from the top of the window to a predetermined mark on the straightedge. The awning should project from the wall a distance equal to one half the window height. Add 2 in. to the length of the top panel for a ½-in. overhang at the top and a 1½-in. overhang at the bottom.

Frame pieces detailed in Fig. 8 are cut from \(\frac{1}{8} \times \frac{3}{4} \times \frac{3}{4} - \times \text{in.} \) angle. To bend the stock, it is necessary to notch one side as detailed in Fig. 10. Bending often can be done by hand as shown in Fig. 5, the metal being held firmly with a screwdriver or other tool.



POPULAR MECHANICS

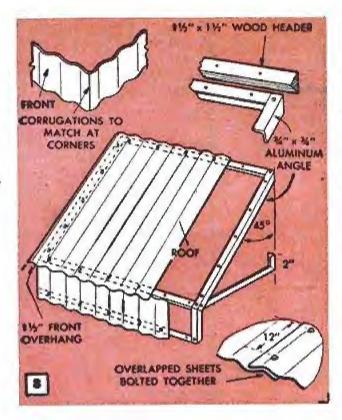


Fig. 6 shows the roof panel being assembled on the frame pieces. Assemble the frame with 8-32 aluminum machine screws, ½ in. long. Fasten the glass fiber to the frame with No. 8 self-tapping metal screws % in. long, after drilling 1/8-in. pilot holes about 6 in. apart.

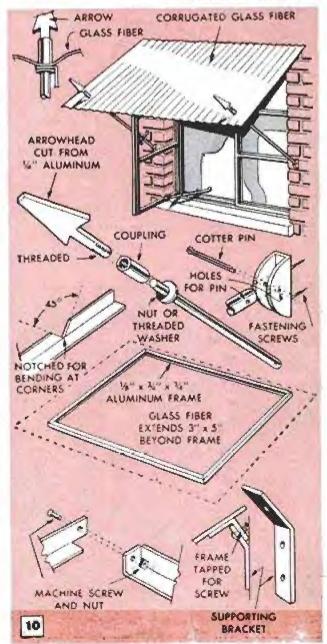
Next, attach the side frame pieces and cut the glass-fiber sides to extend 5 in. below them. Then cut the front apron 5 in. wide, cutting it so that the end corrugations of this piece and the side pieces match. Then drill holes as shown in Fig. 7, and fasten.

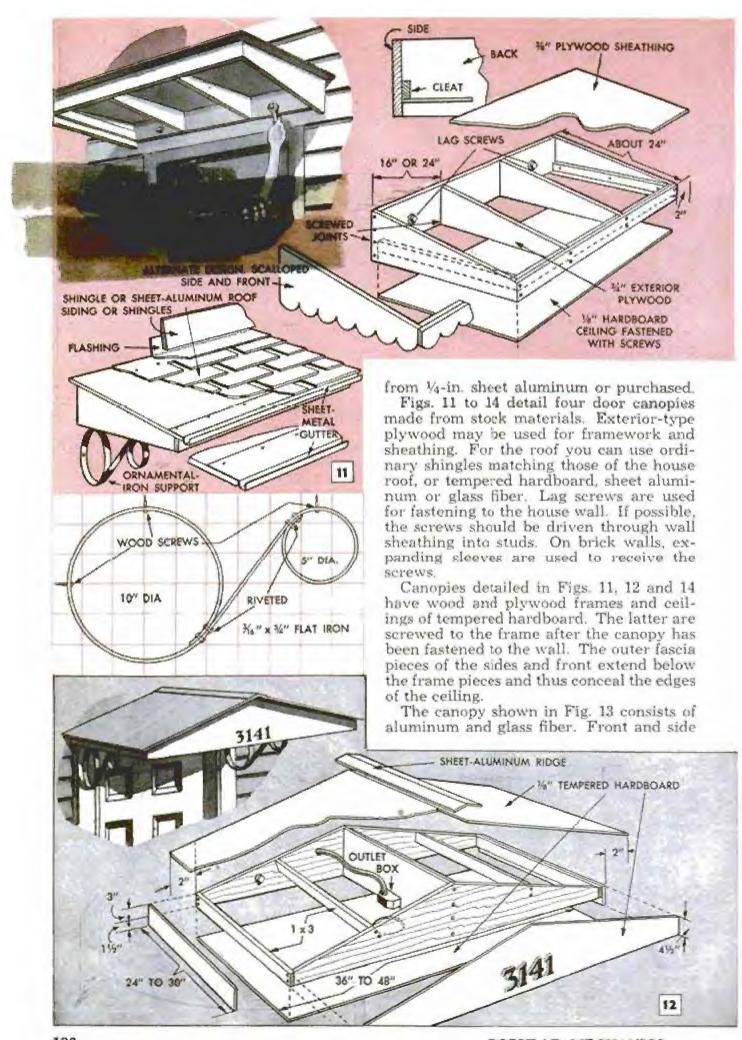
Note from the detail in Fig. 8 that a wood header strip having a triangular cross section is screwed to the top of the window frame, and that the awning frame is fastened to the wood strip with screws driven through both the glass fiber and the frame as in Fig. 9. For awnings wider than the width of glass-fiber panels, two panels are overlapped and bolted together as detailed in Fig. 8.

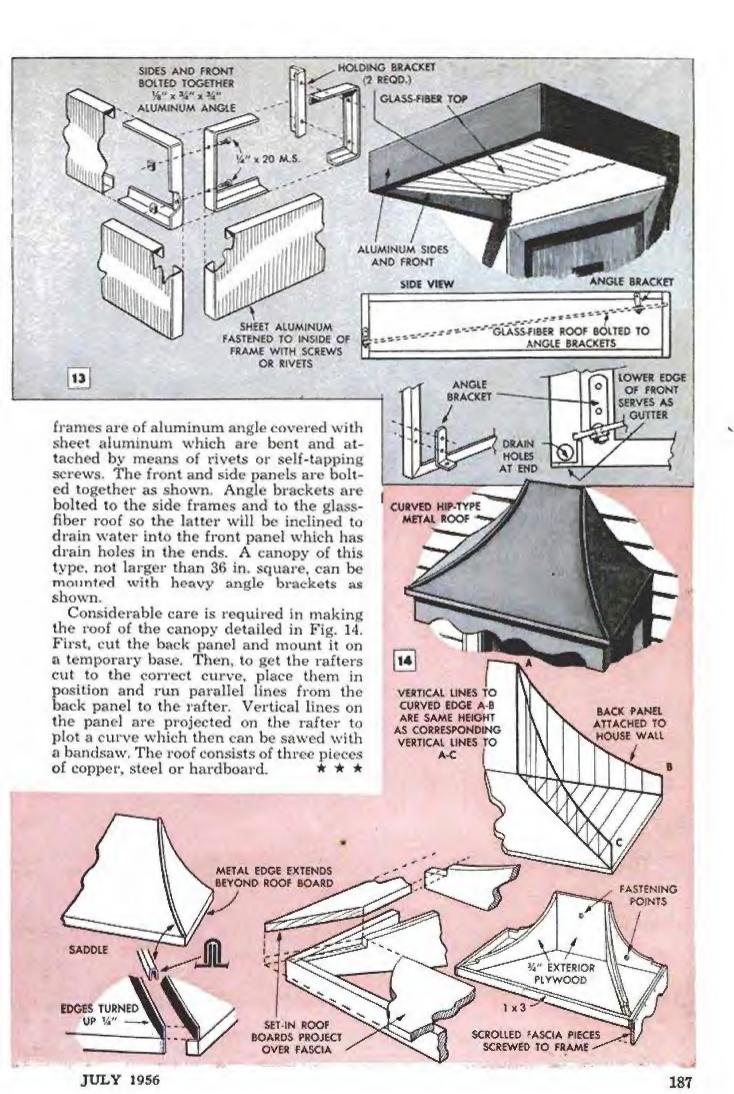
Simplified Awnings

Practical for both casement and doublehung windows, the awning shown in Fig. 10 consists simply of a glass-fiber panel on a frame of aluminum angle. The awning is located a sufficient distance above casement window frames, at a suitable angle, to avoid interference with opening the windows. The braces are aluminum rods pivoted to U-shaped brackets screwed to the house. The rods pass through both frame and glass fiber and are topped by decorative arrowheads, which can be cut

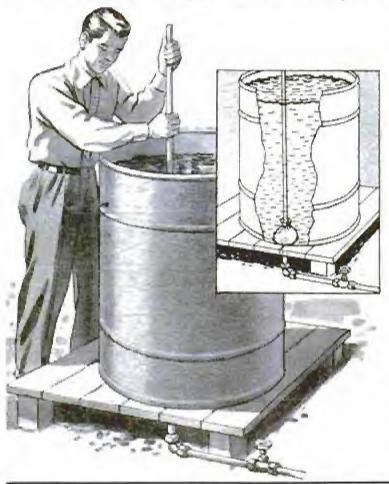








Sandbag Plugs Drain While Repairing Lines



Repairs can be made to the distribution lines of a surface tank, including the removal of the main shutoff valve, while the tank is full, by plugging the drain with a small sandbag. To do so, partly fill a strong sugar bag with sand, tie it firmly to the end of a long pole, and lower it into the tank, pressing it against the drain opening. When the distribution line is dismantled at any point to replace the damaged part, suction of the liquid in the line will draw the sandbag into the drain, forming a seal. When repairs are finished the plug can be pulled out by means of the pole attached to it. — L. M. Geddes, Murwillumbah, N.S.W., Australia.

Jointer Shaves Leather

Leather strapping can be shaved to a required width or thickness, when tacked to the ends of a board and passed over the blades of a jointer. If a jointer is not available, mount the board in a vise and shave the material with a hand plane.

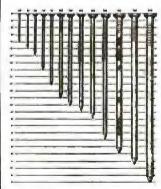
L. H. Weber, Havana, Ill.

Do-9t-yourself MATERIALS GUIDE

for the Homeowner and Handyman

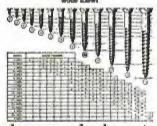
Cross Indexed for Easy Use

If you've ever walked into a hardware store without knowing exactly what you need (and walked out without being sure of what you'd bought), you'll want a copy of this new guide that lists all the specifications for all Do-It-Yourself materials. With this book, you'll know exactly what to look for, and how to save money when you buy.



Need to know how long a 50d (penny) nail is? In the Do-It-Yourself Materials Guide, charts like the one at the left (4½ times larger in the book) will show you it's 5% inches.

The chart at the right, of common wood-screw sizes and gauges, is typical of the dozens of illustrations (all much larger) in the book. Now



you'll know how to choose and where to use building and hobby materials.

A Key to Buying and Using:

Adhesives Fuses Plumbing Bolts Glass Plywood Bricks Hinges Roofing Locks Siding Conduit Millwork Tile Doors Wiring Glass fiber Paint

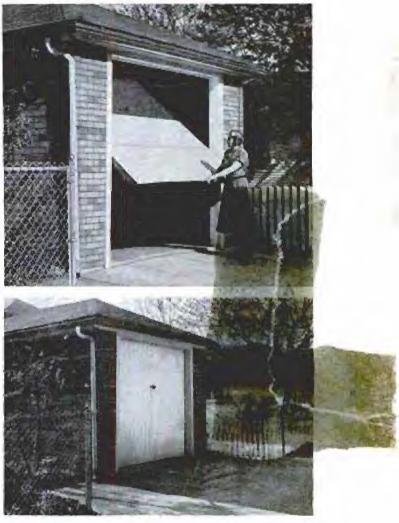
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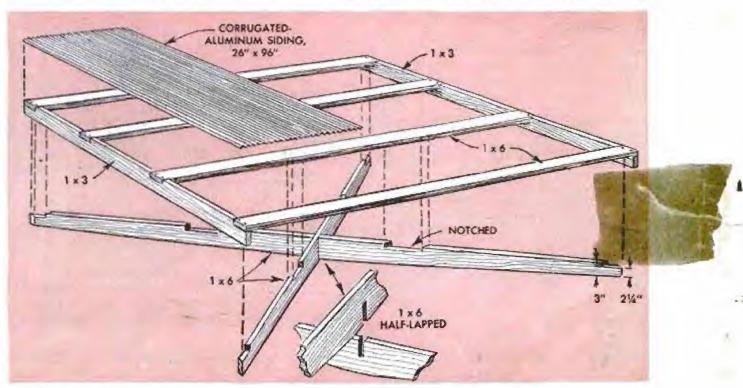
POPULAR MECHANICS PRESS, 200 East Ontario Street, Chicago 11, Illinois

SHOP NOTES

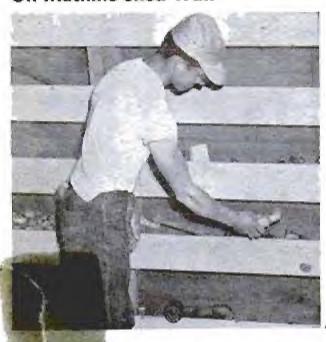
A LIGHTWEIGHT GARAGE DOOR

ARE YOU PLANNING to replace the heavy, hinged frame doors on your garage? Then why not build a lightweight overhead door using corrugated-aluminum sheets for facing? Square and plumb the opening before starting the installation of the door. Referring to the detail below, assemble the door to fit your particular garage. Taper the diagonal braces from full width at the center to the width of the side members at the ends. For ease in handling, the aluminum should not be applied until after the hardware and lifting mechanism have been installed and the door hung in place. The cheapest and simplest lifting mechanism can be fabricated with counterweights attached to the door with chains or ropes, concealing the weights between the studs on one wall of the garage. However, spring balance or power-driven mechanisms can be purchased complete with mounting instructions. The thickness of the wood stock used in the door may have to be increased to accommodate certain mechanisms. As a last step, install weather stripping on the bottom edge of the door and then apply the corrugated sheets, using aluminum nails or screws and overlapping the edges.





Parts-Storage Bins Installed On Machine-Shed Wall



A parts storage facility such as this one, which was built by an Iowa farmer on one wall of his machine shed, offers convenient storage for the variety of parts and materials needed on a modern farm. Ordinary lumber is nailed between the studs for the bottom member of each bin and 1 x 6-in. Lumber is nailed across the studs for the discussion and a study of the side member of one horizontal row of bins should be 3 in. high.

Width of Thin Material Measured More Easily When Bent

To measure the width of a strip of thin material, such as photographic film, with a micrometer or caliper bend it to form a loop. A stiffening effect is produced by the bend that prevents the material from yielding under pressure of the measuring instrument, permitting greater accuracy.



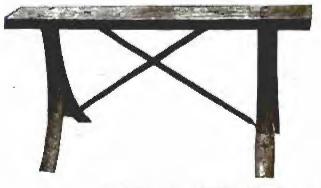


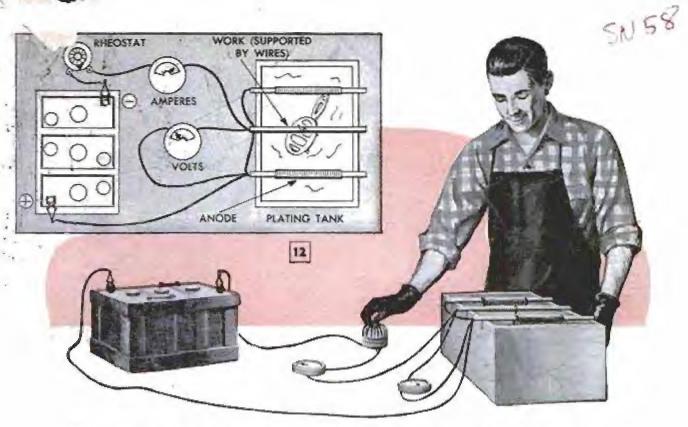
Related Parts Stored in Jars

When storing small parts, such as bolts and matching nuts, glass fruit jars joined at their lids are handy, space-saving units. The jars may be of the same size or vary, depending upon the relative sizes and quantities of the parts stored in them. Fasten the lids together by soldering or riveting. Always unscrew the lid first from the jar that is right side up.

Steel Sawhorse Legs Made From Cultivator Wheels

Sections cut from the wheel rims of a horse-drawn cultivator were used by one farmer as legs for sawhorses. The sections are welded in pairs to form an A-shape, with an angle-steel spreader welded between. The top ends of the legs then are heated, bent over and drilled so a 2 x 6 can be bolted to the top ends. Angles are bolted to the underside of the 2 x 6, bent down and welded to the center of the spreader.





Electroplating Without Cyanides

PART II

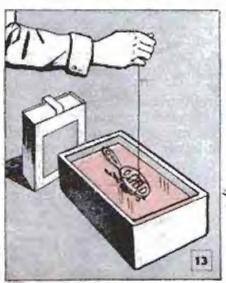
By J. B. Mullen

A THIN LAYER of zinc, electroplated on aluminum from a special fluoborate solution, provides an adherent coating on top of which other metals can be successfully plated. Ordinary plating solutions cannot be used directly on aluminum because the high chemical activity of this metal causes the plating deposits to be rough and in many cases nonadherent over a portion of the work. On the other hand, if the metal is zinc-plated with a special fluoborate solution, durable and uniform deposits from all standard plating solutions are possible. The fluoborate plating solutions described in Part I of this series

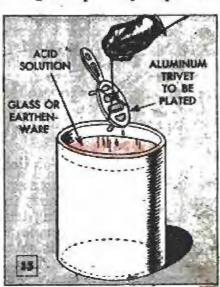
are especially recommended for plating zinc-coated aluminum as their use eliminates the hazards present in other electroplating processes which make use of cyanides. However, it should be remembered that fluoborates, like many other chemicals, are toxic and must be handled and used with reasonable care. This also is especially true of certain of the chemicals which must always be used in the steps preparatory to plating.

Polishing Aluminum

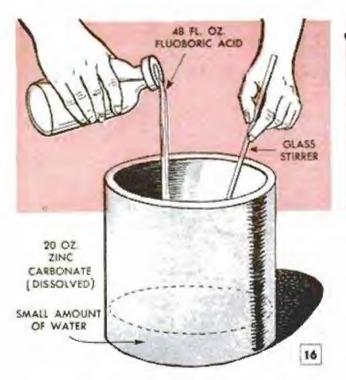
The first step in the preparation of aluminum for plating is especially important







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because of the oxide film which forms readily whenever the metal is exposed to the air. Because of this peculiarity, preparations for carrying out the preliminary steps should be made beforehand so that there is no appreciable delay in carrying them through to the zinc-plating stage. Aluminum, either in the form of castings or fabricated sheets, must be buffed and polished to a degree of smoothness equal to that desired in the finished job. This is because the plating will be no smoother than the surface over which it is applied.

Degreasing Aluminum

Immediately after polishing, the metal must be degreased and cleaned. Degreasing can be done by dipping the item in a solvent such as carbon tetrachloride, Fig. 13. This solvent must always be used outdoors as it gives off a toxic vapor which is a definite health hazard in any enclosed area such as a room or basement. Be sure that all grease and buffing compound are removed in this first preparatory step. Castings, such as the aluminum trivet pictured, need special attention as buffing compound may tend to collect on certain portions of the casting and cannot be removed by dipping alone. These areas may require a mild scrubbing with a soft-bristle brush.

Alkaline Solution

Follow the degreasing step immediately with a thorough cleaning in an alkaline solution made by adding trisodium phosphate, 3 oz., and sodium metasilicate, 3 oz., to 1 gal. of water. This solution must be heated to 170 deg. F. and held at that temperature while the cleaning step is carried

out, Fig. 14. Permit the work to remain in the hot solution for 3 to 5 min., then rinse thoroughly in running water. This hot solution is calculated to remove the last traces of grease, compound and any dirt that may have been present at the start of the cleaning process. The alkaline solution also will etch the surface of the metal slightly. You can test the effectiveness of the steps just carried out by examining the bright surfaces after rinsing. If the metal is not clean the water film will break, indicating the presence of traces of grease or compound or other foreign substances. If the metal is chemically clean the water will form a continuous, unbroken film. If the film breaks it is necessary to repeat the cleaning process, first scrubbing the work in a hot detergent solution rather than a solvent and then repeating the alkaline cleaning.

Acid Solution

Hot-alkaline cleaning is followed by an acid dip, Fig. 15, the solution being made by adding two pints of nitric acid to one pint of water. If the part is of cast aluminum, use instead a solution made by mixing three volumes of nitric acid with one volume of hydrofluoric acid. Hydrofluoric acid attacks glass and for this reason the solution must be made in a wax-lined jar or a plastic container. Using either solution, immersion time should range from 2 to 15 sec. Immediately after dipping rinse the work thoroughly in running water.

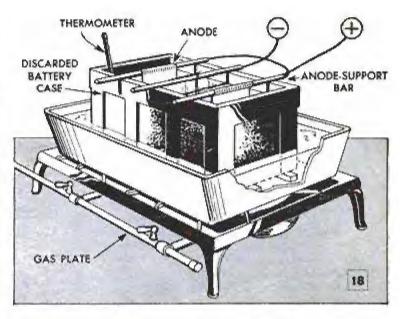
Zinc-Plating Solution

After the acid dip aluminum is free from the normal oxide film. It must be immediately plated with a coating of zinc, which prevents further oxidation and serves as a foundation on which copper and other metals can be plated. A zinc-plating solution is made as in Figs. 16 and 17, the solution consisting of fluoboric acid, 48 fl. oz., zinc carbonate, 20 oz., ammonium chloride, 2 oz., and water to make 1 gal. Dissolve the zinc carbonate in the fluoboric acid, adding enough water to control frothing as the reaction proceeds. Then add the ammonium chloride, Fig. 17, and dilute with water to a total volume of 1 gal. Filter the solution.

A representative setup for plating small items is shown in Fig. 12. If nothing else is at hand to serve as a plating tank, an old battery

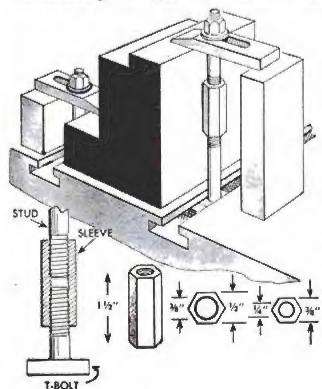
case is just the thing. Clean the interior thoroughly before using. The zinc-plating solution must be heated to about 140 deg. F. in a water bath as in Fig. 18. Hang zinc sheets from the anode (positive) support bars and suspend the work on a wire from the center support bar which is connected to the negative terminal of the battery. No switch is needed in the circuit as current should be on when the work is put in the solution. Plate for about 2 min., adjusting the rheostat to put about ½ v. across the tank. Then remove the work, rinse thoroughly in running water and transfer it immediately to the next plating operation. Avoid drying or handling the work.

Although plating solutions containing



cyanides can be used for plating zinccoated aluminum, the fluoborate solutions, Part I of this series, are especially effective for plating copper and nickel over zinc. A suggested cycle, or schedule, for a nickel finish calls for a copper strike, 5 min. at 11/2 v., copper plate 30 min. at 4 v. and nickel plate, 45 min. at 2 v., using the fluoborate solution. Rinse the work thoroughly after each plating operation to avoid contaminating solutions, one with another. The nickel surface can be buffed to a high polish, using a lime buffing compound, and then chromium-plated or lacquered. If a copper finish is desired, omit the nickel plate, polish to the desired luster and then lacquer.

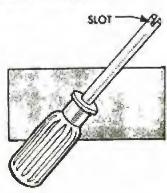
Extending Length of T-Bolts to Clamp Large Work to Table



T-bolts that are too short to clamp large work to the table can be extended to any required length by means of a hexagonal coupling and stud bolt of the same diameter and thread. The extension studs can be made up in various lengths. The extension couplings are cut from hexagonal steel rod which is drilled lengthwise and tapped to receive the T-bolt and stud in opposite ends.—C. W. Woodson, Chicago.

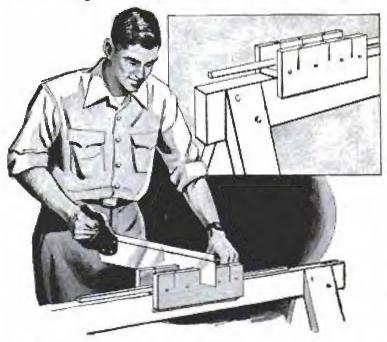
Tool for Valve Core Removal

A handy tool for removing innertube valve cores can be made from an old screwdriver with ¹¹/₄-in.-dia. shank. Cut off the blade and saw a slot across the end as shown. — H. Neustadt, New York City.



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Handy Wooden Miter Box for Use on Sawhorse



A wooden miter box for use when sawing quarter round and small moldings can be constructed from three pieces of scrap lumber in a few minutes. The box is designed to fit snugly over a sawhorse, which supports it at a convenient height and provides for good portability of the unit.

Screws Seal Punctured Can

After puncturing a can to pour out part of the contents, plug the holes with sheet-metal screws. Better than wooden plugs, scraps of cloth or paper, the screws prevent evaporation, eliminate pollution and look much neater.

C. H. Hardy, Whittier, Calif.

Fluted Milk-Bottle Covers are Handy Art-Color Pans

Milk-bottle caps which are crimped and waxed are ideal color pans when doing artwork. Samples of paints may also be mixed in the caps and applied to a test panel to determine the color best suited for a particular job. The caps can be discarded after each project, or filed away for future reference and thus become especially valuable in matching a particular color previously used. They take less space to store than conventional metal pans since they are wafer thin and can be stacked one inside the other.—George R. Karsten, Grand Rapids, Mich.

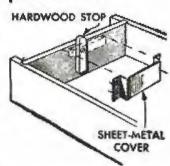
Corrugated Cardboard Strip Makes Simple Crayon Holder

To keep a child's crayons from rolling and getting underfoot place them on a strip of corrugated cardboard. The indentations keep the crayons in orderly arrangement and protect them from damage.



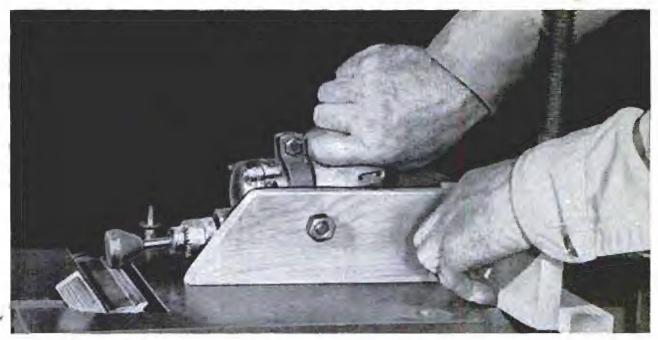
Pivoted Stop on Drawer Back Automatically Kept Vertical

To prevent a drawer from being pulled out too far, install a simple stop of the kind shown. It is a piece of hardwood pivoted to the back of the drawer with a wood screw. Because the part of



of the length—is heavier than the part above the pivot, the stop automatically is kept in a vertical position. A sheet-metal guard may be installed over the stop to keep it from being pushed out of position by items in the drawer. The drawer is removed simply by turning the stop to a horizontal position with one finger.

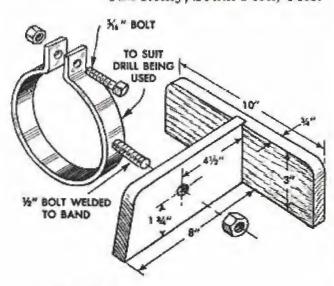
(The bowling-ball bag can double as a carrying case for a press-type camera, flash gun and other photographic equipment. Available in inexpensive canvas or fine leather, it is designed to carry a heavy weight.



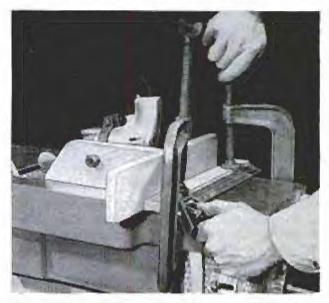
Setup To Grind JOINTER KNIVES

TO AVOID the difficulty of adjusting jointer knives uniformly after sharpening them, try grinding them right in the machine. A grinding wheel of the shape indicated chucked in an electric drill will do the job if the drill is clamped in a jig to slide on the jointer table. In use, position the knife and grinding wheel so their beveled surfaces are at identical angles. Lock the drill and cutterhead in these positions, using a wooden wedge to lock the head. Then clamp a guide across the table for a fence to position the sliding jig. Measuring the space between the knife edge and the table will permit identical positioning of each knife and assure grinding the blades at the proper angle.

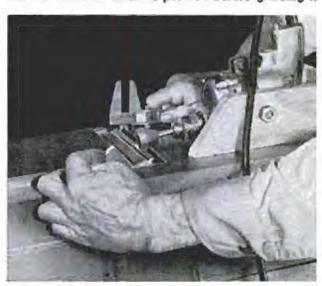
Jim Reilly, South Fork, Colo.



Above, when grinding jointer knives with this jig, be sure cutterhead is held securely with wedge



Above, clamp fence across table to position sliding jig. Below, distance between edge of knife and edge of table is measured carefully so that each blade can be advanced to same position before grinding it



JULY 1956

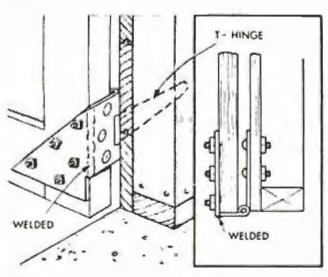
Grooved Plate on Bandsaw Table Prevents Marring of Work



Bandsaw tables in a large aircraft monufacturing plant have been covered with a grooved-metal work surface. Chips and waste particles of metal fall into the indentations in the top plate where they have less chance to may the material being cut

Steel Plate Welded to Hinge Prevents Screws Loosening

To prevent the screws from pulling out of the hinges on a heavy barn door, one farmer welded a triangular-shaped piece of ¼-in. steel plate to the edge of each hinge and bolted it to the door with carriage bolts. The plate is welded at right angles on one flange of each hinge and drilled to accept the bolts which absorb most of the weight of the door sideways, since they run into the door from the side rather than the edge.



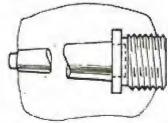


Oil Drum and Spreader Wheel Make Self-Feeder for Hogs

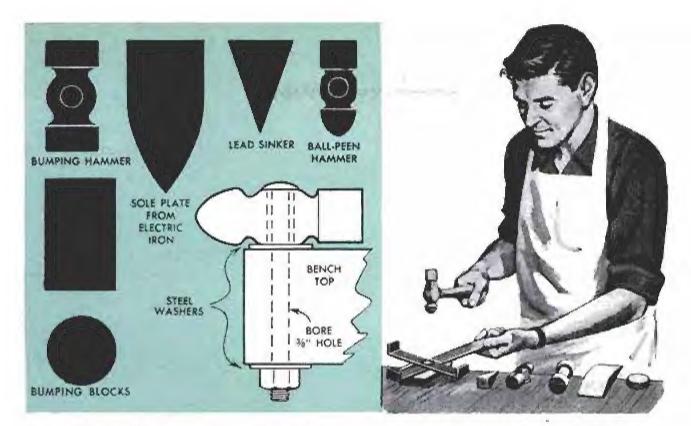
This sturdy 50-gal. capacity self-feeder cannot be upset by large hogs and is ideal for use on concrete floors. It is built from an oil barrel with both ends removed and set on a base made from a manure-spreader wheel. Alternating spokes are cut free at the hub and bent up, where they are welded to an iron tire two feet in diameter. The lower spokes and hub are covered by a cone of concrete 12 in. high in the center and 18 in. in diameter, which allows room for feed to slide out as it is eaten. The barrel can be easily removed when it is necessary to clean it or move the self-feeder.

Tailstock Faceplate Adapter

This simple attachment, shown in the detail, will allow a lathe faceplate to be used as a drill pad when mounted in the tailstock spindle.



It will also serve to mount the 4-jaw chuck in the tailstock when larger work must be held in position for drilling. The tapered shank for the attachment can be salvaged from a discarded drill bit of the type having a tapered shank. To make the threaded nose, recess a piece of hex stock to take the straight end of the drill-bit shank in a drive fit. Then shoulder and thread the nosepiece, the threads being cut to the same pitch diameter as those on the spindle nose of the lathe.



Six Small Anvils for Home Metalworking Shops

If you like to make objects requiring light metalwork, bolt these assorted anvils to your workbench at one end for easier and better metalworking. The sole plate from an old electric iron, the head of a ball-peen hammer, a large pyramid-shaped fishing sinker, the head of a bumping hammer and two bumping blocks used for autobody repair make up the six anvils. The sole plate is bolted to the bench by means of the tapped holes on its top side. Tap a

¼ to ¾-in. hole in the underside of the bumping blocks and sinker for fastening. The hammer heads are attached as shown in the detail. The hammer heads, sole plate and rectangular bumping block should be attached close to the edge of the bench so that they can be turned around for additional shapes to hammer on. When not in use, projecting ends can be swung over the bench. Paint sides of anvils a bright color. Russell J. Love, San Marino, Calif.

Nail Inserted in Cotter-Key Eye Prevents Damage

The eye of a cotter key will not become distorted when driving the key in a tight-fitting hole, if a nail is held in it. A nail can be used in the same way when it is necessary to remove the same cotter key. After straightening the clinched key, slip the nail in the eye and pull the key out with the claw of a hammer.

Leak in Radiator Core Sealed With Aid of Steel Wool

When a car radiator springs a leak in its core too large for radiator sealant to plug, stuff small bits of steel wool in and around the hole. Then pour sealant into the radiator in the usual manner. The sealant fills the smaller openings in the steel wool and thus seals the larger hole in the core. This repair is only temporary and the radiator should be repaired by soldering at the first opportunity.



JULY 1956

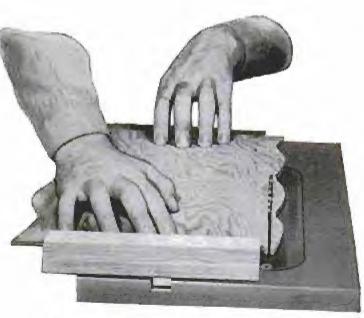


HOW WOULD YOU DO IT?

By Chris Nelson

What's the quickest, safest way to masscut duplicate work on a circular saw?

USE A STOP BLOCK. If you use the fence alone as a stop, the work will catch between the saw and fence and be thrown with considerable force. Always attach a block to the fence as shown above to provide clearance for the severed pieces. Block may be clamped.



How can you rip a board of which neither edge is straight enough to ride against the fence?

MAKE A SQUARING BOARD. This consists of an auxiliary table of ½-in. plywood with a cleat across the front. A second cleat, just wide enough to slide freely in the table slot, is attached to the underside of the plywood. The work is held against the front cleat as pictured above to square one edge of the board. With one edge straight, the fence can be used.

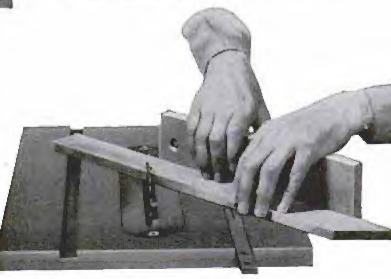


When a circular saw does not have a front table extension, how can you crosscut wide pieces of plywood or lumber?

TURN THE MITER GAUGE AROUND. Plywood and lumber up to a certain width can be handled easily on a small table saw by turning the miter gauge around and holding the work against it in the manner shown above. When the material is greater than 14 in. wide or so, it is best to treat it as a ripping job and guide it by the fence.

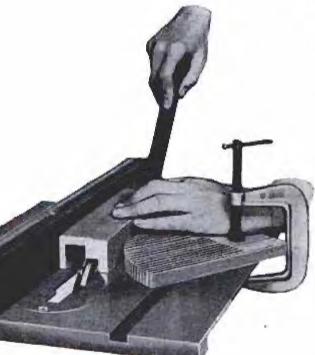
How can you keep the work from creeping when cutting miters?

FACE THE MITER GAUGE WITH SANDPAPER. Sandpaper glued to the face of the miter gauge, or to an extension attached to the gauge, provides a nonslip surface that will help keep the work from creeping while being cut at an angle. Use fine grade of sandpaper.



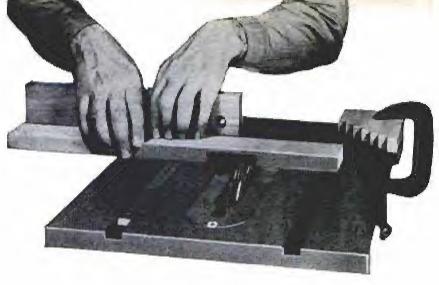
What simple jig can one make to speed up duplicate cutting of wide dadoes?

A STEP JIG. Clamp a stepped block to the corner of your saw table. Each step in it should be cut to equal the width of your dado saw. Besides speeding up the operation, the jig will accurately gauge the first and last cuts to assure each dado being the same width.



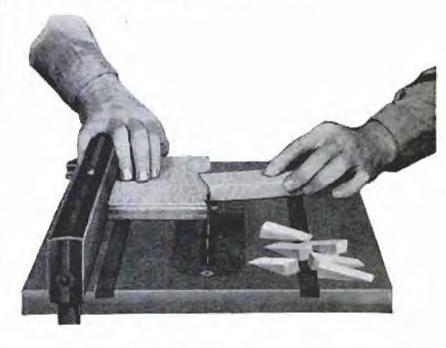
What's the safest, fastest way to cut small wedges in quantity for making wedged joints?

MAKE A WEDGE TEMPLATE. A wedge-shaped notch in the side of a block permits wedges to be cut rapidly by holding stock in notch as work is fed through saw. Stock is turned over in notch after each cut. Grain should run lengthwise.



What fixture can I make that will hold work against the fence when grooving narrow pieces?

A SPRING STICK. A series of saw kerfs made in a board make an excellent spring hold-down when clamped to the saw table to bear against the work. Spring action of thin strips brings pressure against work, holding it firmly against fence.



How can I use my circular saw to make cove molding?

PASS WORK ACROSS BLADE DIAGONALLY. Clamp a straight strip of wood at an angle to the saw table as shown at the left. Start out with saw blade ψ_{16} in. above table and pass work slowly over blade. Continue to make successive passes of work, raising blade about ψ_{16} in. each time. Angle of guide strip determines shape of cove. Edge of work is ripped off to produce cove molding. Gutter and chalk-rail molding is formed by positioning work over center of blade.



How can work be dished on a circular saw?

ROTATE THE WORK OVER THE BLADE. Cut a V-shape in a board and clamp it to the saw table as at right. Then place the disk-shaped work in the V-notch of the fig so that it is centered over the saw blade. With the blade projecting no more than 1/16 in., slowly rotate the work. Raise the blade 1/16 in. and repeat.



Asphalt Shingle Prevents Blowtorch Sliding off Pitched Roof



Socket-Wrench Adapter From Discarded Auger Bit

An adapter for driving socket-head wrenches with a carpenter's brace can be made from a worn auger bit. After cutting off the twisted part, file four flats on the shank to fit the sockets. A pin inserted in a hole drilled through the shank prevents the sockets from sliding beyond the flats. As a means of holding them on the adapter, drill a hole in one of the flat sides nearly through the shank with a No. 30 bit, and fit a ½-in. steel ball backed by a coil compression spring in the hole. Then peen over the surface edge of the hole to retain the ball so that only one third of it projects beyond the surface.

Walter E. Burton, Akron, Ohio,



To keep his blowtorch from sliding off a sloping roof while making eaves-trough repairs, one tinsmith mounted the torch on a slate-surfaced asphalt shingle as shown. Four slots are cut in the shingle to form tabs. Then the rim of the torch is inserted so that the slate surface of the shingle faces down to provide the necessary friction between the torch and roof.

Eyeglass Case Holds Drill Bits

An ordinary eyeglass case provides a fine container for small drill bits and tools used in the workshop. These cases are felt-lined and have a strong spring hinge that keeps the cover

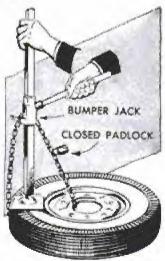


closed tightly. Cutting edges are protected and the bits or tools will not fall out. If several cases are used, label them according to contents for quick identification.

Edward L. Fisher, Milwaukee, Wis.

Bumper Jack and Tow Chain Help Break Tire Seal

When changing tires, the bond between tire and wheel rim can be broken with the aid of a bumper jack placed under a chain that is looped down through the center of the wheel, around the tire. and locked end to end. Operating the jack lever upward will force the base of the jack down

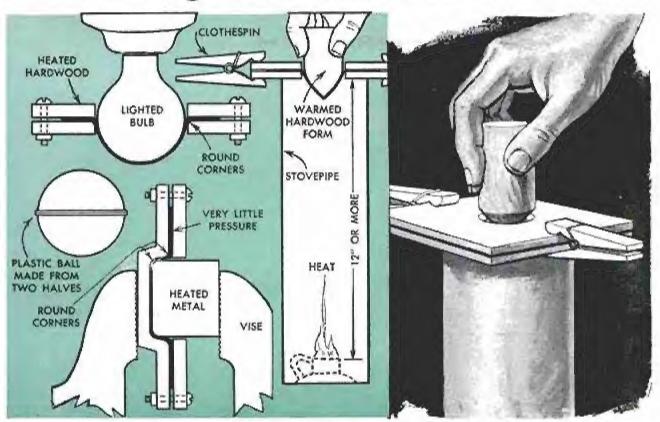


on the tire, thus separating the tire from the rim. If the tire does not immediately loosen, light pressure with the heel of your shoe on the tire close to the rim will break the seal. After one side is free, flip the wheel over and repeat the process on the opposite side and the tire can then be readily removed.—Phil Freed, Chicago.

(Threads on nuts and bolts can be protected from corrosion if they are given a coat of clear shellac before using them. The shellac also will seal a bolt in its hole when used in wood.

SN 58

Heat-Forming Plastic With Dies and Fixtures



Forming thermoplastic sheets into cones, hemispheres and cups of uniform size and shape can be done in the home workshop by the proper application of heat and pressure, and the use of simple dies and fixtures. Hemispheres, which can be cemented together in pairs to make plastic globes, require a fixture consisting of two squares of hardwood or hardboard in which holes are bored. The squares are bolted or clamped together with the plastic sandwiched between them. A light bulb is used both as a die and a heat source, so the holes in the fixture should have diameters equal to that of the largest diameter of the bulb plus two thicknesses of plastic. The die and fixture are shown in the upper lefthand detail. As indicated, all corners in the fixture are rounded to prevent the plastic from breaking or cracking at these points. Some practice will be required to determine the correct amount of heat and pressure to be applied to the plastic. Too much heat will cause the plastic to bubble, and too little will permit it to crack or break. Not enough pressure on the die will fail to form the plastic, while too much will force the die through the material.

Cones are formed by using a hardwood die, or form, as indicated in the right-hand detail. The fixture is similar to the one used for hemispheres, but a different heat source is required. A short length of stovepipe set upright as shown provides an ideal "oven" when a small oil lamp, Bunsen burner or large light bulb is placed in the bottom to heat the fixture which is placed on top. Provision must be made to allow air to enter the lower end of the stovepipe, both for combustion and for cooling. In all cases of forming thermoplastics heat must be applied to the die as well as the fixture to assure that the plastic stays warm and workable. Spring-type clothespins make excellent quick-acting clamps for holding the two halves of a fixture together, when quantity production is desired.

Cups are formed by using a setup as shown in the lower detail. Because the plastic must be drawn, or stretched, to a greater extent to make the cups than to make either cones or hemispheres, the fixture and die should be of metal. The plastic is clamped lightly in the fixture, then the die and fixture are placed in a vise so steady pressure can be applied uniformly.

Carl S, Bates, Chicago.

Lathe Used as Gluing Clamp

When a suitable clamp is not available for holding glued stock, your woodworking lathe may be used as a substitute. Glue the pieces and place them between the head and tailstock, using a small faceplate on the headstock, and adjusting the tailstock to apply pressure. An additional block of wood should be placed in front of the tailstock quill to prevent the latter from marring the work.

SHOPPING FOR TOOLS



SAW-DRILL combination power tool is available in 21-piece kit containing 1/2-in. heavy-duty utility drill with geared chuck and 13 twist-drill bits. Saw attachment with 5-in. combination blade has adjustments for depth and bevel cutting, adjustable fence for rip cutting, and automatic-telescoping lower-blade guard for safety

Black & Decker Mfg. Co., Towson 4, Md.

MAGNIFIER attaches to micrometer, slide rule, height gauge and other instruments for easy reading of vernier scales and height gauges. Magnifier is fitted with 5X lens and attached by means of setscrew. Since device can be used at safe distance from operator's eyes, eye strain is said to be prevented

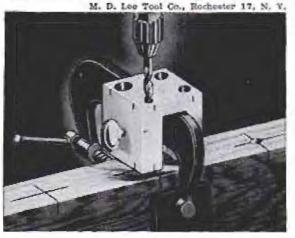
Englass Co., Inc., 57 Shady Way, Rochester, N. Y.



THREADING-DIE HOLDER for power threading of rod, small parts up to ½-in. dia. and up to 6 in. long when 1½-in.-o.d. round threading dies are used. Fitted with No. 2 or 3 Morse taper, the holder travels automatically according to the feed required for particular thread size



DRILL JIG fastened on C-clamp or bar clamp holds drill bit on exact point hole is to be drilled. Also used as dowel jig. Takes 1/4, 5/16, 3/8 and 1/2-in. drills. The jig can be indexed on two axes for more accurate alignment of hole



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POPULAR MECHANICS





VENEER TRIMMER is lightweight portable electric tool that simultaneously cuts tops and bottoms of veneer strips glued to edges of work. Space between trimming blades is adjustable so that tool can accommodate various thicknesses of the work

Albert Fezer, Esstingen A.N.-Zell. South Germany AIR-OPERATED IMPACT WRENCH uses torsion-bar principle to control torque. Tool accurately impacts nut to desired preset torque for precision tightness, then automatically shuts off. While nut is being turned, tool operates at normal power and speed, but when required torque is reached and resistance to turning is equal to preset stress in torsion bar, impact mechanism rebounds and trips rubber-faced shutoff valve. Operation is reversible, and no air-pressure regulator is required, since tool operates at full power and speed Ingarsoll-Rand, 11 Brondway, New York City 4

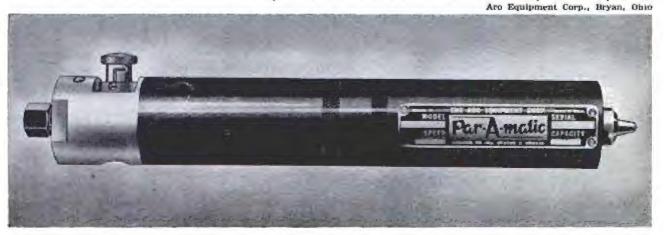
AIR-POWERED CALKING GUN requires only light pressure on trigger to start flow of compound. Release of trigger trips valve that lets air escape and stops flow of compound. Gun will operate on 40 to 100-th, air pressure. To fill gun, cap is removed in two turns and gun mouth placed in can of bulk calking. Pulling out loading rod creates suction to quickly fill gun. Loading rod then is pushed back into gun out of way. Three nazzles with individual end shapes to cover nearly every calking application are supplied with each gun

Calbar Paint and Varnish Co., 2812-26 N. Martha St., Philadelphia 25, Pa-



AIR-POWERED DRILL HEAD is basically an air piston that advances an air motor which rotates drill. Par-A-Matic unit brings advantages of automation to drilling and tapping at low cost. Units are available for automatic or semiautomatic operation

with remote-control valve that can be automatic or controlled by one operator. Unit has speeds from 500 to 17,000 r.p.m., adjustable strake from 36 to 2 in, in increments of 1/32 in. Needle-valve feed-rate controls feed from small fraction up to 8 in. per sec.

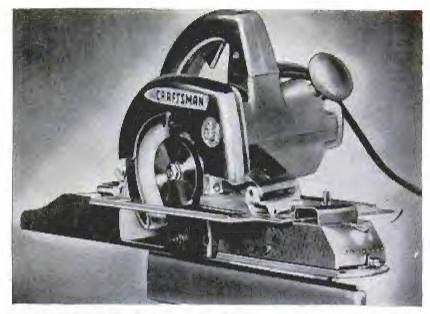




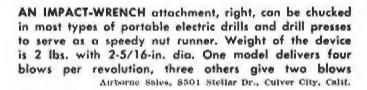
SHOP VACUUM CLEANER removes sawdust and dirt around machines, deposits it in standard-size ash-can unit it is mounted on. Unit's 1/2-hp. motor drives an 8-101. Blroadway.

Craftonis, Inc., 3-101. Blroadway.

New York City 11/3

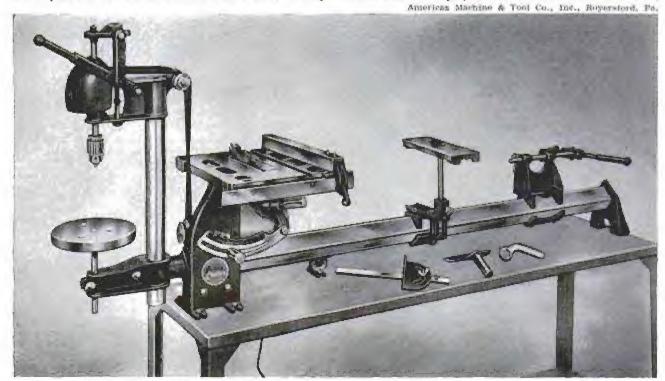


PLANER ATTACHMENT for electric handsaw has over-all length of 20% in. and adjustable front shoe of 7% in. High-speed steel blades permit a 2½-in.-wide cut with depth of cut from 0 to ½ in. Removable fence is adjustable from 0 to 45 deg. in either direction Roten Mtg. Co., 8305 Sovereign Row, Dallus 22, Tex.





COMBINATION POWER TOOL includes vertical drill press, 8-in. tilting-arbor saw and tilting sander, horizontal drill press and heavy-duty lathe, all mounted an a portable workbench. Saw blades lock at any angle up to 45 deg. Sander also takes grinding wheels, buffers, wire wheels. Vertical drill press equipped with ½-in. chuck with spindle travel of 2½ in. Lathe has 8½-in. swing, provides 32 in. between centers



KODAK PHOTO AIDS

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Filters for realism-You can use filters to accent clouds, cut down haze, improve tonal values. And here's the easy, low-cost way to buy them. A selection of top-popular filters, "custom-

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nation . . . is designed for peak results with lowcost M-2 bulbs. Fits most flash cameras, \$9.95.



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from a chair back to a garden fence. (Fine for holding extension flash units, too.) \$5.95.

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Prices are list, include Federal Tax. and subject to change without notice

Eastman Kodak Company Rochester 4, N.Y.



JULY 1956 205

Finish-it-Yourself with these Weldwood Wizards

Want a natural finish? A stained finish? A blond, pickled or wiped effect? They're yours, quickly and easily—with Weldwood's finishing Wizards. It's smart to keep all three handy.

Help kill that wild grain with CLEAR FIRZITE'

Why risk an ugly wild grain finish when staining fir plywood, when a starting coat of Clear Firzite is so easy to apply. Helps tame that wild grain, makes fir plywood look like costlier woods. And for beautiful oak, walnut or mahogany effects, just add colors in oil.



For woodsy blond, pickled and wiped effects - use

WHITE FIRZITE



Gives that woodsy blond finish without a "painty" look. Perfect, too, for pickling and wiping. For pastel tones, add colors in oil. And use White Firzite as an undercoat...it's a sealer and primer in one. Helps prevent grain raise and checking on soft wood and fir plywood paint jobs.

For a fast, modern, natural finish use SATINLAC'

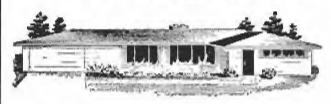
Cuts finishing time drastically because it dries out of dust in 3 to 4 hours. Satinlac brings out and protects the natural grain and beauty of any wood-soft or hard, plywood or solid lumber. Easy to apply-easy to maintain.



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Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, III.

Paneling Darkens

Q—A year ago I in-stalled pine paneling in my kitchen and finished with white shellac and wax. Some of the boards have darkened, some to a very deep shade of brown, some with dark streaks, and in others the knots have turned almost black. Is this due to the wood or the finish? How do I correct the defect?—E. N., Tenn.

A—Many woods, especially knotty pine, gradually darken on exposure to the light. The reds and browns in the wood tend to intensify just as you have described. Some homeowners consider this a have described. Some homeowners consider this a desirable characteristic of the wood, as the aging process usually brings out the full beauty of each individual piece. We know of no way of restoring the original newness of the panels, or boards, that we would consider practical other than the somewhat tedious job of scraping the surface of the boards to expose new wood. We would not recommend that you attempt this due to the labor and time involved. We can recommend, however, that you wax the wood periodically.

Damaged Arborvitae

Q-Among my ever-greens is a fairly large arborvitae which is arborvitae which is located near the corner of the house. Last winter water dripping from a faulty gutter apparently was blown into the top of this evergreen where it trose during a sleet froze during a sleet storm. Weight of the ice bent the tip of the tree. Is there any way of straightening it?
G. N., Ind.



A—We're rather doubtful. The chance that the tip will straighten of its own accord grows more remote as time passes. In some instances it is practical to attach a I x I-in. strip to the trunk with twisted wire, placing strips of rubber cut from inner tube between the wire and the trunk, or passing the wires through short lengths cut from discarded garden hose—anything that will protect the trunk of the tree from damage by the wires. The top end of the strip should extend above the bend a distance equal to the length of the bent portion of the tip. Then lift the tip about a third of the way up and tie it in this position. Leave it

(Continued to page 208)

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Make sure you use the right glue for the job. Weldwood has developed four different types of adhesives to help you on any gluing job. Keep all 4 of these Weldwood Wizards handy at your workbench. They'll solve your gluing problems speedily, easily, successfully!

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100% waterproof! Defies the elements! Use it for every gluing job that needs complete protection from climate, weather, water (even boiling, freezing or salt!), mold, fungus, etc. On boats, in damp basements, for outdoor furniture, or fixing golf

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Bonds instantly, permanently, on contact-without clamps or presses. Easy new way to surface table tops, kitchen counters, etc., with Micarta and other plastic laminates. Easy new nailless way to install plywood panels. Scores of other uses in home, hobby, garage. 29¢, 40¢, 70¢ and larger.

For gluing wood joints like a pro - use

WELDWOOD Plastic Resin GLUE

Powerful powder - easy to mix. Actually makes glued joints stronger than the wood itself. Favorite of top furniture-makers. America's most popular glue. Highly water-resistant, stain and rot-proof. 15¢, 35¢, 65¢ and larger.



Remember-

There's a special Weldwood Wizard for every gluing job. Ask your lumber, paint or hardware dealer... or mail coupon for FREE leaflets.

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Weldwood Plastic Resin Glue Weldwood Waterproof Resorcinol Glue Weldwood Presto-Set Glue Weldwood Contact Cement

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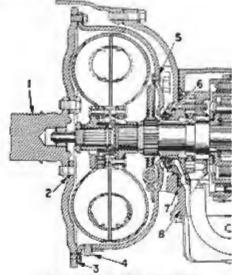
Weldwood

CONTACT



WHERE'S THAT OIL LEAK?

When your car is on the hoist, see if the rear of the engine is covered with oil. This could mean a leak (1) from rear main bearing oil seal, (2) from front bearing oil seal, or (3) if you have automatic transmission, from the torque converter.

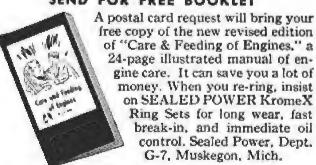


TORQUE CONVERTER

To locate leak, add ½ teaspoon of oil-soluble dye to crankcase oil after engine is warmed up, and let engine run until dye is well mixed. Stop engine, wipe off outside oil, put clean paper under car. Run engine for two minutes at 1000 r.p.m. Colored oil on paper shows main bearing leak.

Uncolored oil shows leak in torque converter.
 Between crankshaft and flywheel; tighten bolts.
 Torus cover and flywheel; tighten bolts.
 Oil drain plug.
 Dampener rivets.
 Front cover oil seal.
 Front cover gasket or pump cover.
 Oil pan to case gasket.

SEND FOR FREE BOOKLET





(Continued from page 206)

for 10 days or more, then raise it further and again the in place. Continue the process over a period of time until the tip is again back to the vertical position. Although never fully reliable, this procedure sometimes works satisfactorily. Much depends on the age of the evergreen and whether or not it is maintaining vigorous growth. Perhaps it is worth trying, at least you are not likely to do any serious harm. The other alternative is to remove the bent tip entirely. For this job we suggest that you obtain the services of a recognized tree surgeon.

Gutter Lining

Q—The gutters on my home are of the round type and are beginning to leak. Examination shows the metal to be rusted through, fine pinholes in the metal causing the leaks. I do not wish to renew them for a year or so. Can I repair them temporarily?

C. A., W. Va.



A—There are several methods of prolonging the life of gutters which have been damaged by rust, but one of the simplest is the use of aluminum foll as a patch. Ordinary foil such as that available for household use will do very well. First clean the affected area thoroughly, using emery cloth and a wire brush to remove all the rust from the inside of the gutter. Then paint the area with asphalt or a prepared gutter paint. Before the paint sets, lay the sheet of foil over the painted area and press into contact with the paint, being careful not to break the foil at any point. Allow the paint to dry thoroughly, then coat the foil, also the inside of the gutter along its entire length with a prepared gutter paint.

Mildew

Q—This year I planted sweet peas in a long row and trained them to an improvised trellis. They made an excellent growth, even though they were within a few feet of a row of shrubbery on the lot line. However, just before blooming the leaves of the sweet-pea vines became coated with a white, powdery substance. Within a short time the leaves began to wither. There were less than half the blooms I should have had from such a large planting. What is this white coating on the leaves and how can I prevent it?—R. N., Ry.

ing. What is this white coating on the leaves and how can I prevent it?—R. N., Ry.

A—Judging from your description the sweet-pea plants were attacked by one of the many forms of powdery mildew. These bear common names which associate them with the host plant. There are apple and pear mildews, grape, rose and so on. The fungi which cause the white coating tend to overlap on various plants and the appearance of the mildew on any one host plant usually is a warning of possible attack on other garden plants. Generally the first indication of infestation is a grayish-white, felt-like coating, or mold, on the leaves. As a rule it makes its first appearance on the underside of the leaf, but sooner or later it will appear on both sides. If the disease is not arrested at this stage or earlier, it spreads rapidly. Infected leaves curl and die as you describe, the effect being that of almost complete defoliation of the plant. Mildew develops most rapidly when days are warm and nights cool. It does not require an environment where dampness is present over long periods of time. Although it is generally associated with cool, shady locations, it can originate and develop almost as rapidly on plants growing in the open where there is plenty of sunlight and air circulation. Because of this it is not always possible to prevent or minimize attack by powdery mildew by locating plantings in dry, sunny plots. For many years gardeners used repeated applications of sulphur and lime-sulphur mixtures to combat mildew infestations and these materials still are fairly reliable as fungicides. However, they now are being gradually supplanted by other materials less difficult to apply and even more effective as fungicides. These are not one-plant products but can be used to protect nearly all types of ornamental plantings against mildew infestation.

DEAS FROM WELDWOOD



The Weldwood Question Box

Q. I want to put some rough flooring down in my unfinished attic so that I can use it as storage space now . . . with the possibility we'll make a bedroom or two up there later. What should I use for flooring?

A. We aren't just prejudiced when we say use plywood. Weldwood Plyscord means a big saving in time, trouble and money. Plyscord panels are unfinished and unsanded-so they're very economical and just right for flooring. Plyscord comes in widths from 2' to 4' and in lengths from 6' to 10', so you can easily find just the sizes you need. If your joists are on 16" centers use 34" thick Plyscord; if joists are on 2' centers, use 34" Plyscord. Plyscord is ideal for attic flooring because it comes in large sheets and is made with mildew-proof glue. And its strength is greater than even diagonally laid planking. Because Ply cord lies flat, it will m subflooring if you decid

This Month's Hints-

CUTTING PLYWOOD:

Hand-sawing a 4' x 8' sheet of plywood isn't difficult if you use this trick. Support the panel firmly on chairs or "horses" and, after sawing a foot or so, wedge a screwdriver into the "slot" you've just sawed. This will keep the plywood sections separated and prevent the saw from binding.

Power-sawing plywood . . . or any wood . . . may produce

edge-splintering if you cut too fast. To avoid this, use a combination blade that's sharp, If it's important to have perfect results, attach a strip of masking tape to the back of the panel where the saw blade cuts through.

ror "This Month's Hints," if accepted of publication. (Hints must apply to some Weldwood product.) Send them to "Weldwood Hint Editor," 55 West of 44th St., New York 36, N. Y.

tile, linoleum or hardwood flooring, later.

Q. Our living room ceiling has a persistent crack that's defied a dozen patching jobs. We've investigated replacing the whole ceiling, but that's much too expensive. Can you suggest something?

A. Yes. Weldtex* squares, which ced furcracking dtex has

of for "This Month's of for publication. (Hints in some Weldwood product.) Some Weldwood Hint Editor," 55 was 44th St., New York 36, N. Y.

*ive striated texture whice or finished nature 124", 12", 1 a distinctive striated texture which can be painted or finished natural. Sizes of squares are 113/4", 12", 16" and 24". And it's not expensive! Enough Weldtex squares to cover a full 10' x 12' ceiling will cost you less than \$35.

HAVE A QUESTION?

Send it to "The Weldwood Question Box," 55 West 44th Street, New York 36, N. Y.

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| ake a good | ring strips, will end yo | TUE |
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CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

Drive-In Dream Castles

(Continued from page 103)

ranch-type buildings first sprawled across the prairie in 1951. Even today it's a supermotel by any standard. Many of its more than 200 refrigerated rooms and suites sport balconies and wood-burning fireplaces. Bamboo-laced cabana apartments surround the kidney-shaped pool. No guest is more than a few steps down the corridor from a free-ice-cube machine. Motordriven buggies deliver meals to rooms, if desired. Carpets have a large assortment of free-form colored splotches woven in, "Built-in food and ink spots and cigarette burns," explains Green. "Now let 'em spill anything; we won't worry." In the big paneled dining room guests pick their own steaks and brand them with an iron that burns R, M, or W (rare, medium, or well) into the meat for the chef's information. Western Hills also provides customers with facilities such as barber, beautician, car laundry, and has a separate set of rooms for guests' maids and chauffeurs, plus a kennel wing for dogs and pets. Suite occupants get a two-car garage, two baths and free golf. Recently, Green added a \$100,000 heliport to all this — "against a possible wave of future airborne travelers." Though more than 100 landings have been made on the pad, some newspaper editors have muttered suspicions that the heliport brings Green far more publicity than helicopters.

Up the line in Tulsa, Okla., Roy Morgan, owner of lavish, rambling Western Village, went Green one better by putting in not only a heliport, but a 1700-foot airstrip and radio station for pilots, plus a direct line to the weather bureau. Small-plane pilots cruising over the Panhandle can go out over the 122.8-megacycle band and contact Western Village radio to reserve a room and plane parking space for the night. A lounge and gasoline pump stand ready to service both pilot and plane. The unique Fly-tel Mo-tel has already played host to several meetings of Flying Farmer officials.

Chances are that few motels will fill their rooms with airborne overnighters for some time. But satisfying every whim of John Traveler is the order of the day, and motels without frills soon find their "No Vacancy" sign gathering dust, while more enterprising managers down the road get the business. Typical of the extremes to which larger motels go are the extras ballyhooed by the 305-room Del Camino in El Paso, Tex., near the Gateway to Mexico. Here, amid Spanish gardens and architecture, surrounding a big, heated, filtered pool, 500 people are bedded on goose-down pillows

(Continued to page 212)

SIX TANK TRUCKS of oil surge through your AC OIL FILTER every 5000 miles!



Here are the FACTS about the miraculous job done by a full-flow AC OIL FILTER



Every 30 seconds your car is running, all of the oil in the crankcase takes a cleaning trip through the oil filter. The magnitude of this filtering job - removing damaging bits of dirt, metal, grit and carbon from the equivalent of 36,000 gallons of oil every 5000 miles-calls for the qualities that are built into AC Oil Filters. Huge filtering area, specially processed filtering material and parallel packing of AC Oil Filters insure efficient, protective filtering over every mile of the recommended period between filter changes. You make a change for the better when you change to AC.

Watch WIDE WIDE WORLD and BIG TOWN . NBC-TV

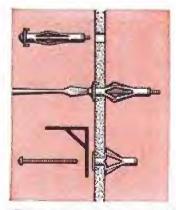


AC SPARK PLUG THE ELECTRONICS DIVISION OF GENERAL MOTORS





makes any fixture-hanging job a simple task. Fixtures can be quickly removed or replaced when redecorating without disturbing the WALLGRIP. Send for new booklet "The Hang of Things", showing how to fasten all kinds of fixtures to any type of wall.



How WALLGRIPS work in hollow walls:

- 1. Insert in Hole. Wings spread as balt is tightened.
- 2. Positive Stop tells WALLGRIP is set.
- Remove bolt and replace through fixture and tighten.

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| rame | |
| Address | |

and 1000 are fed daily. Via 24-hour roomtelephone service visitors can get babysitter service, special baby beds, airline and limousine service, or satisfy any need in the motel's own shopping center.

Such services cost operators money and, in some places, an overnight motel room is more expensive than a similar one in the local hotel. "Our rates have more than doubled since the war," admits one motel proprietor. "Three dollars was a good rate in 1945; today eight isn't unusual. But with tips, parking fees and other hidden charges at the hotel, the tourist still wins at the motel."

The fact is—especially in resort areas of Florida and California—some motels have mushroomed to a point where you can't tell if they're motels, hotels, or even complete cities. Ellinor Village, at Ormond Beach, Fla., looks for all the world like a tremendous housing development. Its 650 separate bungalows for rent by day, week or month, line its own palm-shaded streets. With shopping center, country club and recreation areas the village is actually a

complete community. On Miami Beach's dazzling gold coast, twin 50-foot stone pylons on each side of plushy Collins Avenue mark the entrances to the Golden Gate. With 650 rooms spread over 28 acres, this motel metropolis is everything rolled into one. On the oceanside, fronting a 500-foot sand beach, a 150room four-story hotel connects by tunnel under Collins Avenue with the bay side. Extending half a mile back to the inland waterway, is a vast city of apartment, villa and motel accommodations varying from \$12 to \$45 a day per room in season. Practically all rooms interconnect and, if your family is growing, you can have a suite with as many as 16 rooms. Are you sailing, or driving? For 10 cents per foot per day, you may park your yacht outside your yacht-club apartment, or live aboard and hook into the service facilities at each of the 20 slips at the Golden Gate's private piers. The 800-car parking docks are free. Do you prefer fresh water or salt? Try the beach, either of two swimming pools, or the wading pool if you don't swim. Maybe you'd rather ferry over to the motel's private island on the motor-driven raft and join a pirate party, shipwreck party or roast-pig barbecue. If you'd rather just sit in your room and muse, you may do it in solid comfort on your specially designed studio bed. When used for sleeping it's level. During the day it slides one foot back into the wall on a track that gives it a

Resort motels go all out for recreational

(Continued to page 214)

pitch to the rear like any davenport.

Built-in <u>balance</u> lets a race driver do this

By ED COLE, Chevrolet Chief Engineer

There's a saying among race drivers: "You can't beat a Chevy through a corner." And though we didn't design the 1956 Chevrolet as a race car, we're flattered.

We know that one of the main reasons Chevrolet clings to the road like a magnet is balance—the correct weight distribution between front and rear wheels. A car that is "nose-heavy" tends to plow straight forward in a sharp turn. And because the rear end is light it also tends to break traction and skid.

Note this important fact: a Chevrolet V8 has less weight on the front wheels than any other full-size car!

The stock car racer you see here barreling through a turn is clinging at the very limit of traction—an acid test that you may never give your car. But the balance that has made Chevrolet the NASCAR Short Track champion by a wide, wide margin is just as vital for you at 30 miles per hour on a wet, slippery black-top road. This new feeling of stability is something you'll enjoy trying for yourself . . . so why not let your dealer arrange a demonstration drive as soon as you can. . . . Chevrolet Division of General Motors, Detroit 2, Mich.







drive! No more messy flushing. Prevents

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Simply add a can to your radiator!

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Buy them, try them today!

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METER

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activities, aimed at keeping the tourist for lengthy stays, and to encourage return visits. Drive up Collins Avenue and you'll suddenly be confronted by an enormous coral cliff from which water cascades into a pond, forming an animated sign announcing The Castaways. Activities at this 172room Papuan palace are enough to exhaust the most confirmed extrovert. You can fish free from a private dock, with rod and tackle furnished by the management, or join an organized deep-sea fishing party. The motel maintains a fleet of Scottie Craft cabin cruisers that guests may drive themselves, too. Water-skiing instructions are available, not to mention swimming or dancing lessons. Free movies, and Kaffe klatsches liven up the evenings. Grass skirts and leis are passed out to the gals on "Hawaiian Night," 10-gallon hats and kerchiefs on "Chuck Wagon Night."

Even smaller highway courts hit the "atmosphere trail" now and then. Frank Redford's chain of seven motels is designed to look like Indian villages, with wigwams encircling central lounging lawns, spotted with rustic furniture. Typical is his 19-wigwam village on Highway 66 in San Bernardino, Calif. Each unit, designed to look exactly like a bona fide wigwam with triangular, roll-back entry, is actually of wood-frame construction covered with stucco and secured to a slab. The insulated units are fir paneled inside, with special windows and built-in drain ports to keep rain from the cone-shaped dwellings,

Whether it's a wigwam or urban citadel, the motel is in its heyday, and it looks like a long, happy day for both motelkeepers and Customers. New, superelaborate chains are on the way. Howard Johnson, the ice-cream man, has announced the start of a huge new chain to be run in conjunction with his famous roadside restaurants. Huge franchise chains such as Travelodge. Master Host, Holiday Inns, plan more expansion. Self-policing member organizations like Quality Courts, Superior Courts, AAA require more and better facilities for the traveler each year. The Sheraton Hotel chain has announced its entry into the field with a \$2,500,000 "highway hotel" on the New York Throughway, near Tarrytown, N. Y. To top them all, Hot Shoppes, another national restaurant chain, is building Marion Motor Hotel-a four-story mammoth which they call "the world's largest drive-in." The \$4,000,000 structure occupying seven acres on the Potomac River "10 minutes from the White House," will boast 348 room units.

Even hotel men grudgingly confess their highway rivals are going onward and upward. **



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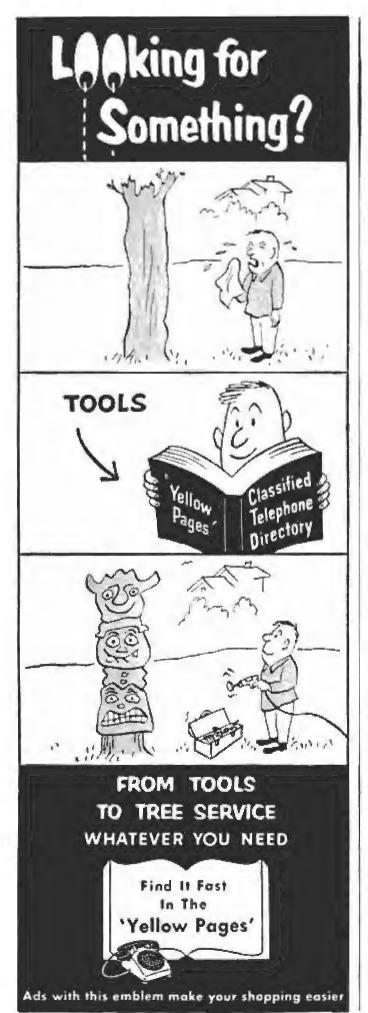
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U.S. AIR FORCE



Ford V8 Has Plenty of Power, Say The Owners

(Continued from page 121)

No Engine Trouble: 74.5%

Just about three quarters of the V8 owners report no engine trouble at all. Another 21.6 percent say they had some trouble and 3.9 percent had considerable. Most-frequent engine troubles were with the carburetor and automatic choke and the valves (3.4 percent each). Another complaint is that the camshaft had to be replaced (2.9 percent).

"Broke valve stem and spring."-Con-

necticut school director.

"Camshaft lobe wore down."-Iowa

service-station operator.

"Blowing head gaskets,"—Michigan Air Force man.

More Best-Liked Features

The following quotations from Ford V8 owners describe other best-liked features and are listed in order of frequency:

"Very good gas mileage. We drove our Fairlane 8590 miles on a trip, averaging better than 18 miles per gallon. No oil between changes."—North Dakota farmer,

"Excellent vision over the front and sides."—Kansas repairman,

"Holds the road well and I like the Ford-

omatic."-New Mexico rancher.

"I drive under the most adverse conditions. Country roads are rough and muddy in winter, rough and dusty in summer. Ford engines can take it. This body is best built of any Ford I ever owned."—Arkansas farmer.

"I like the V8 engine. It's the best auto engine ever built."—South Dakota owner.

"Has good trade-in value. Looks up-todate even when two or three years old."— North Dakota rancher.

"Starts easily no matter how cold."— South Dakota social worker.

"Upholstery is beautiful. Easy to clean."
—Connecticut auditor.

"Easy to park because of raised rear fenders."—Maryland farmer.

"Well-planned dashboard, especially the lighting of knobs."—New York contractor.

"I am a farmer and need a car that can clear ruts and rocks. The Ford is far superior in this respect." — North Dakota farmer.

"Rear lights give plenty of protection."
-New Jersey housewife.

"I can travel in country and through pastures without shaking it to pieces."— North Dakota farmer.

(Continued to page 218)

a whole-house air conditioner Complete two-ton

only \$599

pre-wired unit. **Ductwork and** installation extra. (Unit price higher in Canada)



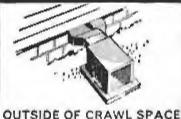
No matter how your home is designed... no matter how you heat it, you can economically install the new Lennox Stowaway Air Conditioner

Lennox, leader in the development of home comfort systems since 1895, announces one of the great engineering achievements of our time-a high quality central air conditioner that costs just \$599. Unexcelled in operating economy, it actually consumes up to 40% less electric current than many other air-cooled air conditioners of the same capacity.

Any middle-income family can now enjoy and afford whole-house air conditioning with this new Lennox Stowaway unit. It requires no plumbing, no water tower, no expensive wiring; has two compressors for maximum comfort. Every style of home has a place for it—either inside or outside, upstairs or downstairs. For it's so compact that it can be neatly "stowed away" most anywhere-to cool and dehumidify the air throughout your entire home.

No matter how you heat your home, it's economical to install this amazingly quiet Lennox air conditioner. Existing ducts will do, if you heat with forced warm air. If you have hot water, steam or radiant heat, a space heater, wall heaters or floor furnace, the simplest ductwork is all you need.

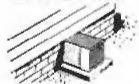
Your Lennox dealer-expert will give you a free estimate on installing a Lennox Stowaway Air Conditioner, available in 2-ton, 31/2-ton and 5-ton sizes.



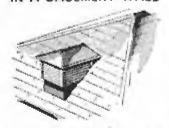
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ON A FLAT ROOF



IN A BASEMENT WALL



AS A HIP ROOF DORMER

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| Street | |
| City | State |

And More Complaints

The following describe additional complaints, listed in order of frequency:

"Worst paint of any car."—Massachusetts supervisor,

"Hard to start when engine is hot."-

Florida bookkeeper.
"Fordomatic whines. Seems to shift

hard."—Washington, D. C., naval officer.
"Fordomatic very difficult to use in snow and ice."—Minnesota engineer.

"No weight in rear end. Gets stuck in snow where most cars do not."—Connect-

icut government worker.
"Engine hard to get at. Some dealers make a labor charge for changing oil-filter

cartridge."—South Carolina accountant.
"Generator too low. Distributor difficult

to get at."—Wisconsin mechanic.

"Tires no good. I've seen eggs closer to being round."—Nebraska engineer.

"Ash tray too far in, causes cigarette to burn padded dash."—Arizona serviceman.

"Rear-view mirror so low can't see traffic approaching from right." — Colorado motel owner.

"Gravel gets into hub caps."—North Dakota school superintendent.

"Heater burns those in front, freezes those in rear."—Idaho mechanic.

"Rear bumper is discolored from exhaust."—Colorado carpenter.

Suggested Changes

We asked Ford V8 owners to list the one change they would like to see made in their cars. Here are some of the most interesting:

"Change places of ignition switch and wiper control."—Kentucky evangelist.

"Vent ducts should be below windshield to avoid sucking in snow and dirt on gravel roads."—North Dakota farmer.

"Smaller taillights. Appear much too big for size of car."—Washington repairman.

"Sacrifice frills to make necessities of better quality."—California professor.

"Trunk opening should extend down to floor level."—Oregon farmer.

"Put more money into mufflers so they would last."—Vermont patternmaker.

"Red light is okay for oil but not for ammeter."—California Air Force captain.

"Redesign front license-plate holder so it won't always get bumped."—California mechanic.

"Eliminate noise of power steering when wheels cut sharp."—Florida owner.

That is the story of the 1956 Ford V8 as told by the owners. For an engineer's version, turn to page 118. For the opinion of a veteran driver, Floyd Clymer, turn to page 117.

HOW TO GET A SAFE MUFFLER AND SAVE UP TO \$8.00 BESIDES

26 gauge inner shell-22 gauge outer shell. Double shell lasts longer. Crimped seams eliminate weak points. Non-clogging extruded holesno whistling, no restriction. High and low frequency tuning chambers. 16 gauge, spun-locked,

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blowout-proof steel heads.«

And do you know why so many new cars have duals? Modern engines need them to conserve their

greater horsepower. So think how important it is if you have a single muffler that it be a good one. Silentone® gives you more power, yet costs less. Scientifically designed to keep back pressure at a minimum, it assures you top performance and mileage. Many stores install Silentone at big savings to you. Buy Silentone and save up to \$8. P.S. If you prefer that deep mellow tone, get Dynatones. They're engineered, not packed. Write for name of your nearest store.

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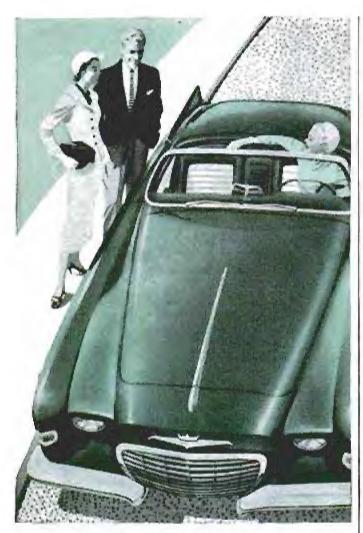
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Clymer Tests the Ford

(Continued from page 117)

there is some roll on the corners, the car handled exceptionally well, even on sharp curves and over rough bumpy roads. The hard-driving, long-distance driver may prefer a stiffer front end.

Power Brakes Are Smooth

The power brakes with fixed anchor, are smooth, effective and have little tendency to fade when used at high speeds or in braking while descending steep mountain grades.

The test car had Fordomatic transmission (a three-element torque converter with planetary gears, and a good one) and a rear-axle ratio of 3.22 to 1 (especially suitable for high-speed cruising).

Our car had the 292-cubic-inch V8 engine (which Ford now calls the Thunder-bird Y-8 engine) with 8.4-to-1 compression ratio and a four-barrel carburetor. Its horsepower is 202 at 4600 revolutions per minute.

The Fordomatic transmission is efficient and smooth shifting. By floorboarding the accelerator, you can downshift up to 65 miles per hour. If the throttle is held wide open, the upshift takes place at 68 miles per hour. Locked in Low range, the car has terrific acceleration. This gear is valuable for use in braking when descending steep grades.

Ford's power steering is of the linkagebooster type. There is a 25-percent steering effort, which gives a slight drag on the wheel and some "feel" of the road. The steering wheel, lock to lock, requires almost 4.75 turns. It should be less for a power-operated steering unit. I like faster steering.

There was minimum engine or body vibration, although there was considerable hood and front-fender tip flutter at cruising speed on rough roads. The body seems well insulated and solid and there was but slight body noise or rumble at high speeds.

The location of the instruments is excellent and there is no upper half horn ring to obstruct vision. The speedometer, clock, fuel, temperature, generator and oil indicator lights, as well as shift-lever indicator, are neatly housed in one group, well protected by a top shroud to eliminate reflections at night. The shift positions are different from most other automatic-transmission cars. These positions are entirely satisfactory, but I'd like to see positions on all makes standardized, as it is bothersome in two-car families where the shift positions of different cars are not identical.

(Continued to page 222)



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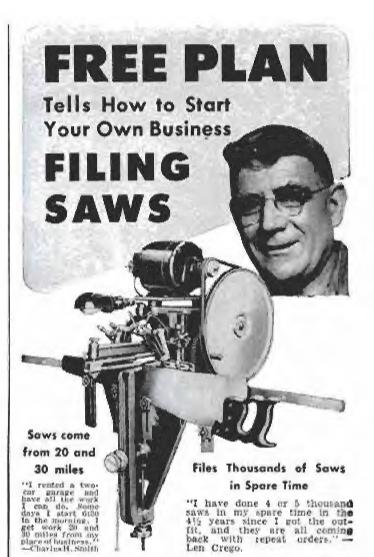
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The high-beam warning light is small, poorly located and hard to see quickly at night. It is directly below the 60 mile-perhour point at the top of the speedometer and the speedometer needle hides it at that speed. The defroster and heater are effective, but the controls are more complicated than necessary. At times I found it difficult to adjust to the right degree of heat.

I do not like the left-hand-operated key starter, but the southpaws will enjoy it.

The glove-compartment door requires considerable one-finger effort to open, and the lid drops too far when opened, sometimes whacking the knees of a tall passenger. It is not a good arrangement.

The driving position is easily adjusted to fit each individual and cushions are well padded with good springing. Interior appointments are all of high quality. The doors open and close easily. Outside handles have push-button latches. The body seems tight and, during a rather severe duststorm and a high-pressure water test, no dust or water leaked into the body. Twice during the long test, squeaks and rattles developed, but they disappeared as mileage accumulated.

Vision in every direction is excellent and the high fender tips, front and rear, are convenient guides for parking or maneu-

vering in narrow places.

The dual exhaust pipes extend through the rear bumper, which is a neat arrangement. However, soot and dirt soon gather along the bumper edge, making it easy for a person to soil his clothing when walking around the rear of the car in close quarters.

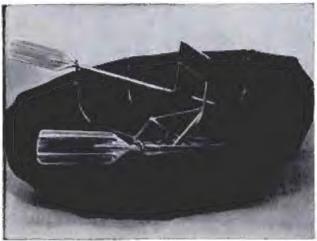
The hand brake has close ratchet graduations and is easily operated. The pendulumtype brake pedal is fine, but for those who still operate throttle and brake with the right foot, the pedal is too high from the floor, as there is a four-inch travel between the closed throttle position and the off brake-pedal position.

Ford's center-fill gas tank is practical and I can't understand why other makers do not copy it. However, the 17-gallon tank is too small for today's cars as in certain isolated regions it may be a long distance between filling stations, especially at night

in the west.

Although I have some minor criticisms of the new Ford, I found many highly desirable features such as: the "big car" solid feel; the excellent acceleration; exceptional performance in Low gear; ability to maintain long, sustained high speeds with little effort, and comfortable ride—returning to Los Angeles I drove 900 miles the last day and no low-priced car has ever given me a more comfortable ride with less fatigue.





Folding Boat

Fishermen and duck hunters can carry along a new folding boat and assemble it in one minute. Detachable ribs made of aluminum tubing form the framework of the boat. A cover, made of heavy cloth coated with Vinylite, slips over this framework. The resulting boat measures six feet by four feet and draws only two inches of water with 200 pounds aboard. A folding chair and lightweight oars are included. The boat, complete with chair and oars, weighs only 24 pounds.

Rainfall Indicator

Rainfall is continuously measured and recorded on a moving chart by a compact electric instrument. The collected water acts as an electrolyte to complete a circuit and turn on a heater that evaporates the water. The amount and rate of electricity needed for evaporation indicate precipitation. The unit measures total rainfall to the nearest .01 inch and an expanded lower range for extremely low rainfall has a minimum sensitivity less than .002 inch per hour. Optional features include snowfall measurement, an alarm circuit to signal the onset of precipitation and a floodwarning alarm circuit preset at a critical rate.



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ZONE

STATE.

We'll Conquer Antarctica With Wings

(Continued from page 76)

spots proved it thick enough to support the 72,000-pound Skymasters. Scarlet trail flags were frozen in holes, marking off a runway 9000 feet long and 300 feet wide.

Antarctica didn't give up easily, though. One Seabee work crew creeping across the ice through a blizzard in a Weasel, tumbled into a big crack and spent two harrowing days on the ice until helicopters could rescue them. A ski-wheel Otter with seven men aboard, crashed on take-off and left its battered occupants stranded in a survival tent on the wind-swept wilderness for 14 hours until sleds and stretchers were found to bring them out. A ponderous sled train, hauling Ground Control Approach equipment from ship to strip, nosed into a 10-foot crack and had to be abandoned. That left the world's southernmost airport without equipment to bring its planes home through treacherous blizzards or whiteout.

In spite of it all, on the big day, six ships of Task Force 43 stationed themselves at 250-mile intervals across the polar sea between McMurdo and New Zealand, forming a unique chain of radar beacons to guide the big planes in. Tethered to that electronic leash, eight medium-range Navy craft lumbered from runways of two New Zealand airports. Besides the Skymasters and Neptunes there were twin-engine Dakotas and two twin-engine Albatrosses. Fierce headwinds that gobbled fuel at phenomenal rates forced the Dakotas and Albatrosses to turn back after 900 miles. But 14 hours after take-off, the other four settled toward McMurdo's frozen water under a brilliant midnight sun. In one Neptune, less than an hour's fuel remained. "Routine, that's all it was," announced one grinning pilot as he stepped to the ice.

Cold-Weather Flying

With VX-6 established on its icy base, the business of getting flights under way during the short good-weather period began. Problems were strictly unique.

Antarctica's deep sub-zero temperatures play havoc with aircraft. Ice crystals form in gas lines. Fuel a plane to capacity on a frigid day and, when the temperature rises, the gas will expand and spill all over the place. Moisture freezes on radio-aerial insulators, so the base can't contact the planes in flight. Oil solidifies. Tires of parked planes develop frozen flat spots where they squash against the ice, resulting in a bumpy, "square wheel" take-off. Grease freezes wheels rigid so they skid

(Continued to page 226)

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BUY LUFKIN TAPES . RULES . PRECISION TOOLS AT YOUR HARDWARE OR TOOL STORE 354 THE LUFKIN RULE CO., SAGINAW, MICHIGAN instead of rolling. Even skis give pilots trouble. When parked, they freeze to the snow and must be pried loose. A skiequipped plane on snow handles like a seaplane on water. There are no brakes. When landing, the plane keeps going. It's hard to maneuver. "I hit the drifts to slow down and help make turns," one pilot explained to me.

Antarctica boasts the world's worst flying conditions. The vast continent (about the size of the United States and Australia combined) sits on the bottom of the world like an overturned saucer. In the center of a land mass ringed and slashed by bleak uncharted mountain ranges, is the flat, windswept polar plateau. In places the endless table rises gradually to 14,400 feet. Even a veteran pilot can't tell by eye if it's 100 or 1000 feet under him on a clear day. "A picture of it anyplace," according to one Navy photographer, "is like a snapshot of a bedsheet."

Arctic Whiteout

Worse for VX-6 pilots than the blizzards that howl across this snow prairie were were the whiteouts that engulfed it. Whiteout is not, as many people think, a fog or snow condition. Visibility may be hundreds of miles. But the overcast sky matches the white of the snow, erasing all signs of horizon. There are no shadows; depth perception is lost in a two-dimensional world. "You can be flying upside down and not know it," one pilot explains. "It's like flying around inside a frosted globe."

It was allegedly because of a whiteout that Lt. Hal Kolp, burly VX-6 Marine pilot of the first long-range flight on January 3, wound up at the South Pole instead of western Wilkes Land, where he was headed. "We paralleled a whiteout," he reported later, "and that course took us over the pole. It was perfectly flat, with long, gentle snowdrifts that made it look like a stationary white sea with moderate swells. We dropped to 500 feet and threw out smoke bombs, lamp black, ink and a piece of cardboard. Everything disappeared in the soft snow."

The report indicated snow too soft for landing planes there next year, when 20 men and 350 tons of material—including a big snow tractor—are to be flown in by the 18th Air Force, to construct a South Pole base. A few days later, however, Admiral Byrd and Dr. Paul Siple, Deepfreeze's senior scientist, made a second flight over the bottom of the world and decided Kolp's gadgets must have fallen into thick, blowing drift. Such drifting snow can be raised 50 feet off the ice by 100-knot winds. From

(Continued to page 228)



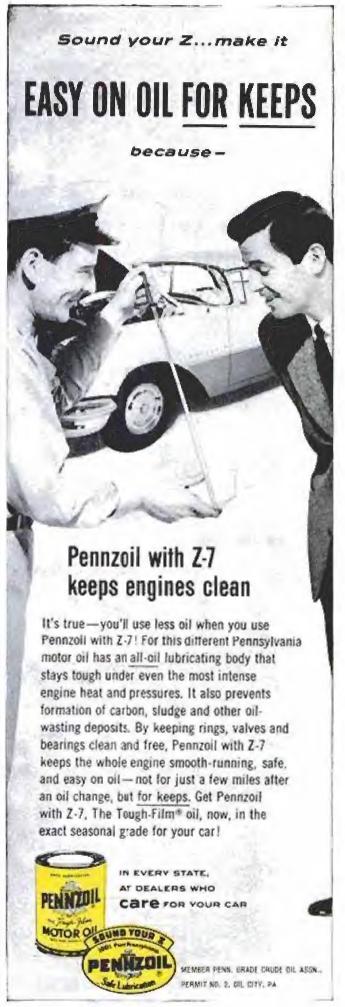
Automatic Boat Bailer

Boats are bailed automatically by a new attachment for an outboard motor. An aspirating nozzle is attached to the motor housing near the propeller. A tube connects it with a float valve in the bottom of the boat. When the motor is in operation, suction is created inside the tube. The float valve opens when any water is present. Some outboard motors are factory equipped with automatic bailers, but the new bailer can be installed on any motor of five horsepower or larger. The speed of the boat has little effect on the bailer, as it is the speed of the propeller which determines how fast the bailer operates.

Golf Handicapper

You can determine golf handicaps quickly and accurately with a compact computer. The 10 selected scores are dialed with a stylus through a curved slot in the face of the metal unit. The correct handicap appears in a window on the face.





the air it appears solid. Doctor Siple reported sastrugi, or long thin drifts of snow, pointing like arrows in all directions, indicating light variable winds that should pack the snow solidly enough for next year's big operation.

Jet-Assisted Take-Offs

All VX-6 flights roared out of McMurdo Sound with the blue flame of jato bottles gleaming against their sides for an added push. Most headed south through the great Beardmore Glacier, traditional gateway to the high polar plateau. "How do you get to the South Pole?—You go to the Beardmore Glacier and turn right," was a standard gag bandied between plane crews.

To fuel, planes flew 40 miles to the ships, landed beside them on the ice edge, and took gasoline through a 1000-foot hose. Some even took off on their polar missions from beside the ships. Few flights had the tense drama of Entrikin's, but several crews had experiences they'll never forget.

Flying over unexplored wilderness west of McMurdo, Lt. Comdr. Hank Jorda and his boys saw what they believed to be new mountain ranges, with 12,000-foot peaks, reaching away for nearly 100 miles to the southeast. "They were brownish rock in sedimentary layers, only partly snow covered," Jorda reported. The plane barely made its discovery when a leak developed in the oxygen system. Hours of flying at 13,000 feet found everyone dazed and befuddled in the first stages of anoxia. "We had trouble adding and solving the simplest navigational problems," Jorda revealed when their plane finally landed at the base.

Endless White Wilderness

What's it like to fly out over that white wilderness? "You go on forever above an endless table of nothing but ice with feathery patterns of sastrugi rippling the surface," reported one correspondent who drew the lucky card and made a 14-hour flight into unknown territory. "It leaves you speechless, and you wonder many things. What's under it? At one time it was subtropical, but how far beneath the surface is the ground? Or is it really a great inland sea encircled by mountainous islands? No one really knows. You think of your family, and wonder why you ever had those infinitesimal arguments."

For thousands of miles, all that many of the flight crews saw below was a dirty white blur—Antarctica's trick of refraction, when light bounces off floating ice crystals, resulting in zero visibility. That's what happened when one Skymaster finally circled the pole. "About 800 feet below was the magical spot from which all directions are north," noted one disgruntled observer, "and I couldn't see a thing."

The crew members spent their time at picture-taking chores, rubbing frozen feet and reading whodunits. Monotony of the flight was broken by meals cooked on ranges in the plane. The thoughts of most crew members were never far from the grim reality that if their plane were forced down, chances of survival would depend largely on their ability to walk home. Most planes carried enough survival gear to support the crew for 60 days on half rations, but few men entertained much hope of getting out if they landed.

"Chances would have been about one in a thousand," according to pilot Hank Jorda. "You'd spend the rest of your life down there—and your life would be real short."

Actually, every life on every flight hung on the thin thread of mechanical efficiency—and the ability of the busy navigator to bring his ship some 1500 miles out from, and back to a tiny point on McMurdo's ice.

Radio Altimeters Essential

"The 'hairiest' thing about flying in Antarctica," according to Capt. Hank Partridge, navigator observer for the USAF with Deepfreeze, "is the altitude of the polar plateau and uncharted mountain peaks. The stratosphere is at ground level. The plateau may look like a billiard table, but actually it can creep up under you from 9000 to 14,400 feet. If you kept a firm altitude you'd run right into it. So you watch the radio altimeter, and when it hits 400 feet—start climbing."

All Deepfreeze planes carried radio altimeters. The gadget sends out a radio wave that echoes back from the terrain below, much like a ship's sonar that sounds ocean depth. The navigator makes his reading from a cathode tube like a small radarscope in the cab.

Finding the way across limitless white expanses makes the polar navigator's job really tough. "Magnetic compasses spin, dip and dance around like mad, due to the nearby south magnetic pole," Partridge explains. "So we use a free-running gyro compass with north as the destination and call it synthetic north."

On ordinary charts for temperate zones, a straight-course line will cross each meridian at nearly the same angle, providing a navigator with a constant figure for checking course along the route. At the pole, however, meridians converge sharply. "If you measured the same angle on each meridian," says Hank, "and flew your plane on the heading you got, you'd wind up flying in a snail-shell series of diminishing

(Continued to page 230)

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circles until you finally disappeared in your own exhaust stack." To avoid any such calamity. Partridge and other polar navigators use a transparent plastic grid of parallel lines that they lay atop the chart they're using. "They're really synthetic meridians," he explains. "We call it 'flying the grid'." By flying the grid, and using synthetic north, the polar navigator has it made—provided he doesn't run into white-out, blizzard or the ground.

VX-6 had its taste of bitter medicine. Pilot Bob Streich and co-pilot Glen Lathrop were bringing three Seabees and a photographer back to Little America from a trailparty camp 600 miles out in Marie Byrd Land. "Everything was fine during the first hour," Streich told me later. "Then suddenly we hit freezing rain and blizzard-driven snow. We couldn't see the front end of the cowl. I was trying to turn out of it when I saw the radio altimeter unwinding—and I knew this was it!"

Plane Hits Mountain

A second later, the plane rammed headon at 80 miles per hour into the side of a bleak polar mountain. The belly slammed against the slope and the craft skidded uphill to a roaring finish. Miraculously, the slide saved the day. Not one man sustained a scratch. By canny use of survival techniques, the seven survivors were able to preserve themselves and start walking the 110 miles across the North Alexandra mountains to Little America. When they were found, seven days later, they had only 85 more miles to go.

The wild flurry of rescue attempts to save these men resulted in the crash of a Navy Neptune in South American jungles while flying from Maryland to Antarctica to help in the search; a smashed wing on another Otter while being ferried to the area, and total loss of a third Otter when it dropped from the crane of the Glacier as it was being swung ashore at Little America.

In addition to these losses, three of VX-6's helicopters "bit the dust" during the short Antarctic summer—one whirling into the water when its servomechanism went haywire. The other two just plain wore out under the stresses and strains of coldweather flying.

But by the time the big planes flew back to the States, there was little doubt that wings over Antarctica had advanced the clock by a good many ages. The map and exploration work achieved by VX-6 planes in 10 days would have taken overland trail parties a good 50 years to accomplish. Otters, flying back and forth between bases

(Continued to page 232)



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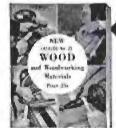
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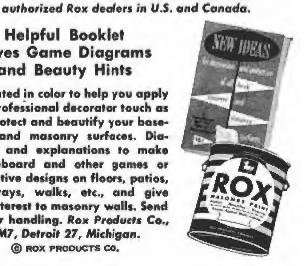
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and forward camps saved months of weary lumbering in slow-going snow vehicles. Helicopters airlifted men and materials between ships and base sites on a roundthe-clock basis, set cartographers on inaccessible pinnacles, and poked into places even dog teams could never reach.

Commuter Service Next Year

Next year, the air attack against Antarctica's icy barriers will be even more in-tensive. "There will probably be commutation service between New Zealand and McMurdo Sound," says Rear Adm. George Dufek, head of Task Force 43. An earth runway will be carved from the volcanic ridges. Early in the season, with a fuel cache established at the foot of Beardmore Glacier, Otters will head out over the plateau and land on the pole. The 18th Air Force's flying boxcars, flown by Capts. Art Grafe, D. I. Mallory, Hank Partridge, Jim Cummings and Lts. John Tomasch and Ernie Schmid, will air drop prefabricated buildings and one light tractor over inland bases. To brief themselves on the ins and outs of Antarctic aviation, all these men made flights with VX-6 planes over the polar plateau this year.

"All you have to remember," says Hank Partridge, "is that the ice, like the sea, is not dangerous—but it is extremely unforgiving. A polar pilot learns to keep his head out of his back pocket—or else." * * *

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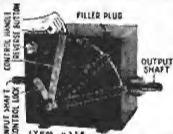
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How Atoms Generate Power

(Continued from page 93)

There are three major types of reactor cycles included in the AEC's research program and in the private developments. One is a boiling-water cycle, another a pressurized-water cycle and the third a liquid-metal-cooled cycle. Each type of cycle attempts to produce steam for the generator in the most efficient manner.

One side issue being investigated is the fact that some of the reactors have an ability to "breed" new atomic fuels at the same time they are producing useful heat. Thorium placed in such a reactor system is slowly converted to fissionable U-233. Eventually only thorium would need to be added to such a reactor to keep the chain reaction going. This happy condition, a furnace manufacturing its own fuel, may have an important effect on the cost of electricity produced by atomic reactors.

There are five main groups of reactors, each utilizing one of the three basic cycles. being considered either in the AEC's pro-

gram or as private ventures.

Boiling-water reactor: In simple form this is a chamber containing a number of rods of fissionable material, plus control rods that can be withdrawn to bring on a chain reaction. The heat thus created is taken up by water that circulates through the reactor to keep it cool. The water produces steam which drives a turbine.

Power for Submarines

One variation of this is the pressurizedwater reactor, the type that powers the submarine Nautilus, using water under 2000 pounds' pressure per square inch. The water attains a temperature of 465 degrees F. before boiling, producing superheated steam. A modification of this pressurizedwater reactor is now under construction at Shippingport, Pa., and is intended to create 60,000 kilowatts of electrical power. The Yankee Atomic Electric Co. of New England proposes to build one of this type to produce 134,000 kilowatts, for completion in 1959.

Consolidated Edison of New York contemplates a reactor to be completed in 1960 that would create 236,000 kilowatts of elec-tricity. This would be a pressurized-water reactor with an oil-fired superheater added to the cycle to raise the temperature of the steam to around 1000 degrees F. About 140,-000 kilowatts of the total would be generated by nuclear fission.

Dual-Cycle Boiling-Water Reactor: Another boiling-water reactor is the dualcycle design developed by the Argonne

(Continued to page 236)

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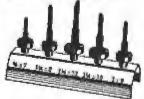
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National Laboratory, which converts some of the water into steam inside the reactor chamber itself. General Electric plans to build one of this type for Commonwealth Edison of Chicago and its associates in the Nuclear Power Group, with a capacity of 180,000 kilowatts. Boiling-water reactors as a group appear to be about 22 percent efficient in converting atomic energy into heat and thus into electricity.

Homogeneous Fuel Reactor: One of these, under construction at Oak Ridge, consists of a container into which a suspension of enriched uranium salts in water is pumped until enough uranium is present to produce a chain reaction. The container is surrounded by a neutron reflector and has control rods to adjust the criticality. The fuel solution becomes hot in the reactor chamber and is continuously pumped through a heat exchanger where it delivers much of its heat to a separate water system, producing steam.

One advantage of this system is that it eliminates the need for expensive solid-fuel elements which must be replaced periodically. It is also a breeder. Thorium in heavy water circulates in the blanket surrounding the core and is slowly converted into fissionable U-233, which can then be used as fuel.

Push-Pull Type

One variation conceived at Los Alamos is a push-pull homogeneous reactor. In this, two reactor chambers are connected by a tube in which the enriched fuel solution is placed. This "soup" is first pumped into one of the reactor chambers where criticality is attained. Heating up, some of the liquid turns to steam and the pressure of the steam forces the solution back through the tube, where it loses much of its heat to a heat exchanger, and into the other reactor chamber. Here the heating cycle is repeated. The fuel solution is thus forced back and forth, continually giving up some of its heat in the heat exchanger. A separate water system in the heat exchanger, thus heated, provides steam for driving a turbine.

Sodium-Graphite Reactor: Metallic sodium melts at 208 degrees, becomes a gas at 925 degrees. These properties make it very attractive for conducting heat at ordinary pressures. Atomics International, a division of North American Aviation, Inc., is using molten sodium instead of water in a power reactor that will be operating this year and that will deliver an estimated 75,000 kilowatts of electrical power.

In this design, the reactor core consists of rods of U-238 enriched with U-235, plus

(Continued to page 238)

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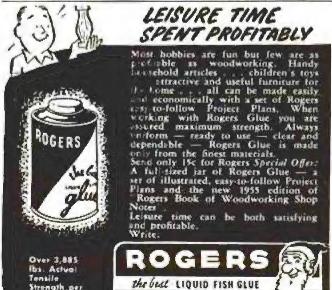
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the usual control rods. The reactor is surrounded by walls of graphite that act as a moderator, slowing down the fast neutrons.

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Increased Efficiency

A General Electric version of this reactor will be used to drive the submarine Sea Wolf. Sodium-graphite reactors are expected to have an efficiency approaching 30 percent. Ultimately the circulating sodium may be brought up to a heat of 1200 degrees, with a corresponding rise in efficiency.

Sodium-Cooled Fast Breeder: Another reactor employing sodium as a coolant is the sodium-cooled fast breeder. Instead of slowing down the neutrons with graphite, as is done in the sodium-graphite reactor, this design permits the fast neutrons produced by the fissioning U-235 in the core to strike a blanket containing U-238 atoms. This converts them into fissionable plutonium and, according to the theory, more than one plutonium atom will be produced for every U-235 atom consumed. Detroit Edison and its associates are planning to use this type of reactor for a 100,000 kilowatt reactor station to be completed in 1960.

Atom Power for Large Ships

There are modifications of the reactors outlined above, each seeking a slightly different way of attaining the greatest efficiency. Separate studies are being made, too, of reactors that would serve as power plants for large ships. Aircraft propulsion and packaged power units for the military also are being studied, but a great deal of research will be necessary before they become practical. The military power plants would be small central stations that could be transported to areas where electric power is needed.

So the answer to the question "What happens after Arco?" is simple. Arco was the first public step in a chain reaction that is rapidly picking up speed. Nuclear energy will become increasingly important in our lives-at a rate faster than most people think. It is startling to realize how much progress has been made since the first reactor was built under the grandstand at Stagg Field, on the University of Chicago campus in 1942-only 14 years ago. Yet the course of history already has been * * * changed by it.

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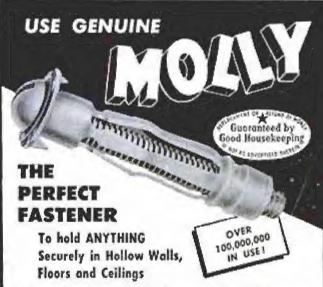
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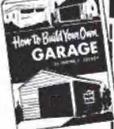
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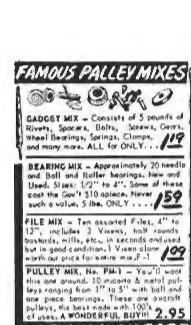
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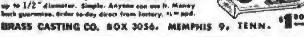
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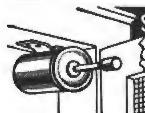
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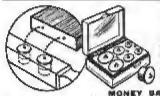
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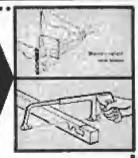
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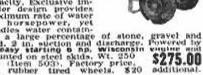
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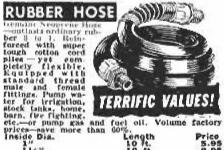
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